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APRIL, 1919

THE BRUCE PUBLISHING COMPANY
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PEXTO
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No. 2

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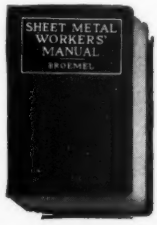

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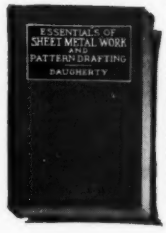

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PEXTO

SHEET METAL WORKERS' MACHINES & TOOLS

INDUSTRIAL-ARTS MAGAZINE

Vol. VIII APRIL, 1919 No. 4

A PRACTICAL PHILOSOPHY OF ART SUPERVISION

James P. Haney, Director of Art in High Schools, New York City

THIS paper is written for the purpose of saying what the department seeks to do thru supervision. It is an attempt to set forth the aims and motives which lie back of the requests and suggestions made from time to time. As these aims and motives have cleared and broadened for the writer, so it is believed that they will clear and broaden for you. Thru such clarification, it is also believed that a deepening of mutual understanding cannot help but come. This will aid in furthering the ends for which all of us are employed and for which to be successful, we must work together.

Not all the aspects of supervision are touched upon in the following statement, nor of those points which are noted, are all of equal weight. But in the main, under the several headings, will be found those elements of supervision which touch most closely the work of the individual teacher. You are asked to consider each statement carefully and to make its implication apply to the everyday work of the classroom. This, it is believed, will serve to aid in the advancement of that work.

What the Department Seeks to Do Thru Supervision:

1. *To Develop Morale.*

Morale has been emphasized as the first essential in armies in the field. It is equally essential to the success of a department in a school system. In one sense it is the finest expression of the department's service. It is a spiritual thing, a power born of a deep and abiding faith in the value of the work done. It takes pride in that work as a product of many hands and minds serving in a common cause. It takes pride in its own professional training and in the school system of which it is a part. It is a force which continuously moves each worker to give his best effort possible for the good of the whole. It is a standard by which all supervision is to be tried. In last analysis, that is best which develops the highest morale in the group which it serves.

2. *To Develop Co-operation.*

Co-operation, or joint service, is an essential to all successful effort made by any association of individuals. It means friendly aid between director and teachers, and between teachers of individual schools and of separate schools. Its principle is mutual help and mutual teaching. Each is to learn from every other. It puts each member of the group into possession of the successful methods and devices of all. It pools information and resources. It makes for joint pride in the results and lessens individual jealousy and criticism. It constantly seeks means of "doing together." To this end the monthly conferences of the department are chiefly aimed, but there are many other aids in its development: departmental meetings in each school; the chairmen's meetings of the department; special committees assigned to consider special problems, etc. It seeks continually to strengthen the hand of one teacher by the aid of another, and similarly, to strengthen the work of one school by the aid of other schools.

3. *To Give Aesthetic Appreciation to "The Many."*

The majority of students in our high schools are to be trained in taste, rather than in technique. They are gifted with moderate ability and can have their power to see and their power to draw strengthened along limited lines. Their training in practical aesthetics is one to be stated, not in terms of technique, but always in terms of taste. The department aims, therefore, to make the great mass of these pupils "aesthetically reactive" thru its teaching. By this is meant that these pupils are to be led to view their surroundings in dress, in home, in city life, with the consciousness of the good and bad art displayed and a knowledge of how the bad relations may be made better. Hence, the department seeks to have the teaching deal, first, with those art aspects of the world which the pupil sees directly at hand. It would teach taste rather thru the effort to create good design, than by "talking about art." It would make its work practical. It would even emphasize the money value of the craft work produced, that the pupils might feel the element of reality that attaches to their performance, and thus lose the sense of the school exercise. The department would use every device, especially assembly talks, to reach "the many" in this way.

4. *To Give High Technical Training to the "Few."*

Every high school contains a limited number of pupils of talent. Steps should be taken to discover these early in their school career and to foster that talent thru special courses and opportunities for advanced study. For these pupils sympathy and aid are of great importance. The aim should be to keep them under the influence of the high school as long as possible. Those who leave early to go to art schools suffer on the side of their intellectual training. If they are to be held in high school, they must be

Note—This paper was originally prepared as a statement to the art teachers of New York City.—*Managing Editor.*

given work which enlists their interests because of the opportunity which it offers to them to exercise their special gift. Courses have, therefore, been devised to be offered as electives in the upper years of the high school. Every school should seek to present one or more of these courses for the training of the talented. They present opportunities to those pupils to specialize and at the same time to earn credits toward their graduation on the same basis that credits are offered for advanced work in languages, science and mathematics. Properly developed, this advanced elective work makes it possible for every high school to meet the needs of those who desire later to undertake the professional study of art in schools of drawing, painting, or industrial design. Every high school may, therefore, be made within due bounds, a place for the sifting out of the talented and for the preliminary training of those who should see their special ability cultivated along technical lines. Additional opportunities should be offered wherever possible, by the creation of poster clubs, craft clubs, etc., that small groups of pupils may receive training adapted to their needs.

5. *To Differentiate Courses of Study.*

Different high schools thru their courses of study attract different types of students. The course in drawing and design offered in these schools should be adapted to the needs of these students. This means that the general course of study is to be differentiated in different schools, to the end that the principles of drawing, construction, color and pattern, in each school may be presented in exercises co-ordinate with the general work and aims of the school. Commercial pupils should, therefore, develop problems in commercial drawing and design; and mechanic arts pupils, problems dealing with construction. More than this, there should be an effort to differentiate all problems to meet the separate needs of boys and girls. Both the drawing and the designing of academic schools should express this purpose. The boys' work should touch masculine interests in construction and application; the work for girls, feminine interests in the home, in dress, etc. Individuality in the work of both teacher and pupil is to be sought thru this effort. Individuality in the work of the school as a whole should likewise be the aim. The art teachers of each school may wisely study the needs of the community served by the school that all the work they present may reflect these needs.

6. *To Offer Post-Graduate Instruction for the Talented.*

Scholarships have long been offered to deserving students in academic schools. These scholarships have given their post-graduate instruction in college courses. Similar scholarships should be offered to talented pupils in the arts, that these pupils, already given some technical training in high school, may have their talent perfected by highly specialized courses in drawing, color and design. In foreign schools the advanced training of these pupils is regarded as an important business of the state. Their talent is looked upon as a state asset. Our own country has not yet undertaken to foster this kind of special training. Opportunity, however, offers to every high school thru the co-operation of the School Art League to establish scholarships in leading industrial art schools thru the payment by the high school art department, of one quarter the usual fees. Twenty-five dollars thus pays for the full year's post-graduate tuition of any talented pupil. Several schools have already selected pupils for this training, raising the funds for the purpose thru bazaars, entertainments and sales of constructed and decorated forms made in the art department. A generous and altruistic motive may thus be attached to the practical work of each department. Each should aim to support one or more of these scholarships and every pupil should be made to feel a personal interest in contributing to the development of the talent of the gifted boy or girl. There is inspiration in this act of contribution. To emphasize this, the work of the graduate pupil done in the art school should be brought back to the high school for exhibition. It will serve as additional stimulus to those coming after.

7. *To Cultivate Art Interests of the Students Outside the Schools.*

Many students may be given training in taste who cannot be trained in the refinements of technique. Opportunities should be offered to these students outside of the requirements of the prescribed course of study. New York City, in its museums, galleries and shops, presents unlimited possibilities for the training of taste. Every school sees a considerable group of pupils who more or less keenly feel "the desire of beauty." These pupils should be made to understand that the teachers of the art department warmly wish to aid in revealing beauty as it exists in pictures, sculpture, architecture, and the applied arts. The School Art League is an organization maintained in order to further the training of these pupils. It seeks to include them in its membership. It would have them visit museums and galleries frequently and would offer instruction thru speakers who understand and sympathize with the viewpoint of young people. Every art teacher is therefore urged to arrange general talks on art and for visits of self-elected groups to picture and sculpture exhibitions. Careful study must be made in the presence of the beautiful thing. The pupil without instruction will see little. With a few words of aid and of skillful questioning, he may be made to see much. Every student so interested should be led to feel that in the art department there stands a friend solicitous for the learner's advancement in appreciation and in that trained power to choose which we call "good taste."

8. *To Promote Study and Raise Technical Standards of Teachers.*

A good teacher is one who remains a student to the end. A good department is one made up of teacher students. To further the work of these is one aim of supervision. Various methods offer assistance

thru conferences, school visits, special courses, etc. To raise technical standards practical work must be done. The teacher must draw, or letter, or design under guidance, very much as does the pupil. Summer courses offer certain opportunities for this practice, but other classes closer at hand and more immediately touching the needs of the schools are required. The Saturday class has been created for this purpose. It is of especial value in that its lessons are conducted by skilled technicians drawn from the high school corps itself. These lessons present both methods and technique in their most available form. A great saving in time and effort is thus effected by those who come as students, and the spirit of emulation is stimulated thruout the work of the group. Every teacher should also be aided in the development of a library. Each school should possess a working library of art books, and each art teacher a more intimate collection of books developed to meet professional needs. The general conferences of the department serve as a means whereby the latest and most useful works are brought forward and made known to all.

9. *To Raise Teaching Standards.*

The teaching standards of any group are determined by the best teachers in the group. The aim of supervision must, therefore, be to bring before the group, as a whole, the ideals, aims and methods of its most skilful members. Thus, suggestions as to the planning of work, the preparation of lessons, the development of illustrative material, and the analysis of methods and devices used in questioning and in blackboard illustration, are to be explained by instructors who, themselves, have established these standards of teaching at a high level of excellence. It is not enough that these elements of lesson presentation be illustrated in conference. They must also be demonstrated in the classroom. Teachers must expect to teach before their associates and the most gifted members of the corps must look upon their skill as something which it is their privilege and duty to pass on so far as may be to their associates. In a corps moved by this spirit, there will be no professional mysteries, no private devices, or secret tricks of trade. Each member will feel a pride in contributing to the good of the whole and in passing on to others every successful plan or contrivance. Similarly, each member will feel a satisfaction in being made the recipient of the aid of other contributors. The efficient teacher is never too proud to learn.

10. *To Promote Order and System.*

A school studio is a place which, of its very nature, requires care in direction. It has many models to be looked after, many forms of supplies, and many drawers and portfolios for students' work. To keep the drawing room clean, to hang the walls with changing exhibitions, and to secure good housekeeping on the part of the three or four hundred students who use the room, is a task which calls for executive ability of a high order. In addition, the art teacher must keep class records and make out reports. Parallel courses must also be planned for different classes of the same grade. Many separate exercises must be going at the same time, and if craft work is done, different forms of material must be supplied. To accomplish all this successfully, the class teacher should be aided by skilful and willing pupils. There must be commendation for these aids and a continued effort to make plain how they serve their associates. As cleanliness and neatness are peculiar virtues in a drawing room, the effort to secure them must be continuous. Well-kept files, well-kept bulletin boards, and well-kept portfolios, offer perennial topics for discussion. Every teacher will be aided who learns the abiding value of a card catalog in the planning of work and the keeping of illustrative material. System and order are always to be found as the handmaidens of good work. Thus, those who would achieve aesthetic success, must not, in administrative details, weary of well doing.

11. *To Secure Interchange of Ideas.*

The clinical methods of medicine offer useful suggestions in teaching. As doctors gather at a clinic to observe the practice of their associates, so teachers are wise to seek opportunities to observe others teach. The "discussion" of the conference becomes the "graphic demonstration" in the classroom. Advantage, therefore, lies in any plan which seeks to secure systematic visiting on the part of all teachers of the drawing corps. Such visiting should not be permissive, but required. It insures a constant interchange of ideas on the part of the visitor and visited. Particularly, must it be made plain to the first that good suggestions are the things to be looked for. Criticism during a visit should be held in abeyance, and the eyes kept open for anything in matter, manner, or methods that will aid the visitant. This continual study of the work of the most successful teachers and this continual interchange of classroom courtesies, is one of the most effective measures for identifying the work of the individual teacher with the work of the group. It helps in the use of "we and our;" it lessens the emphasis on "I and mine." Individuality is strengthened, not weakened, by this practice. The good teacher takes pleasure in aiding those who come for aid, and in continually seeking for fresh means whereby that aid may more effectively be given.

12. *To Develop the Spirit of Emulation.*

The desire to feel the thrill of success is universal. It is common to both teacher and taught. With it goes the desire to lead, to keep one's lamp shining a little ahead of the next. Supervision seeks to use this human instinct as a means to a heightened standard. The entire corps is thus caused to review the finest work the department knows. Each can mentally try his own performance against this standard. If it suffers by comparison, he is persuaded to do better; if it does not, he is cheered by his success. There is a classroom implication in this. It suggests that the best work of every class be kept be-

fore the pupils as a whole. Every studio should see a continuously changing exhibition. The more good work shown, the better, that all pupils may be stimulated to have their work selected. Tests of skill between associated groups depend upon this spirit of emulation for their success. Classes of the same grade may compete as groups to see which can secure the higher standing. Classes of different schools may, similarly, compete in the trophy contests. All of these competitions are only means devised to one end. They seek to hold up to public inspection and praise that which is legitimately entitled to such praise. But each, from the smallest to the largest, must be conducted in the spirit of "true sport." The result must show honest classroom teaching. No forced product is of service. It is not the winning that counts, but the effort to stand fairly first, that profits the worker and the school.

13. *To Develop a System of Awards.*

Every system that deals with large numbers of individuals comes in time to develop some system of awards. The brave soldier receives a medal; the successful salesman, a prize; the faithful street car employee, a stripe upon his coat sleeve. There is a moral in this for the art department. The good work of the skilful teacher should be recognized by honorable mention in conference and in reports. A letter of commendation to one who has done distinguished service should follow close upon that service. Similarly, there should be rewards in each high school year for the foremost student workers. To this end medals have been instituted in each of the high school years that the public giving of these may call attention to the work of these skilled pupils. To the same end, industrial competitions are arranged from time to time with local prizes of a kind to enable each school to reward the cleverest of the contestants. Never to be forgotten is the fact that the value of the reward, its interest and stimulus, have nothing whatever to do with its intrinsic worth. The medal takes little from the material of which it is made. It is the recognition, not the medal, that counts. The department that grasps this, devises stimulating competitions and makes every one a fair test with no favor, has in its hands a powerful instrument for its own development.

14. *To Improve Equipment.*

An art department depends in no small sense for its success upon the material things in its equipment. The difficulty of making bricks without straw has been crystalized as an aphorism in our language. It is a difficulty that confronts an art teacher without an equipment adequate to the purpose. Models and storage room for them are essential, if representative drawing is to be done; materials and room for their keeping, if craft work is to be accomplished. This means that supervision, to be effective, must look to material needs as well as spiritual ones. Studio equipment must be maintained and bettered. Both the standard and flow of supplies must be insured. The individual teacher who lacks essentials will find the department anxious to aid. Where new buildings are erected there offers opportunity for the planning of well-arranged rooms with ample exhibition and storage space. The "standard studio" has become not an impossible ideal, but a practical one in which the good ideas of many teachers are embodied. With its plans and specifications, it presents a definite picture which can be created in every new building. These plans also stand as specific recommendations for the remodeling and betterment of old unequipped rooms. In this very specific way, therefore, the department is prepared to serve in providing opportunities for good work.

15. *To Develop Beautiful Studios.*

Closely associated with the better equipment of studios is the beautifying of these rooms. Exhibitions have been called essential to successful classroom practice. Every studio must, therefore, possess abundant space for the display of good work. Nothing makes more for cheerful surroundings, particularly, if the teacher remembers how valuable color is in stimulating interest. Half a dozen well-arranged exhibition panels will transform any room. They serve to make the studio a place pleasant to come to and pleasant to study in. A few pieces of well-displayed still-life will add to this interest, but it must be the teacher's continued effort to prevent the room from becoming an example of what not to do in decoration. The dingy cast, the badly hung picture, the cluttered sink and overladen plate rail, give no aesthetic thrill. Yet it is the art teacher's first service to give this thrill. The beautiful room undoubtedly gives it, and the teacher, who would best serve the pupil, will strive, therefore, to make the studio at once a well-kept workshop and a delight to the eye.

16. *To Affect the School as a Whole Thru Its Art Department.*

The work of the art department is only done in part in the drawing room. There is a larger service to be performed for the school as a whole. This is the bringing of the influence of the art department to bear upon the varied activities about it. It is a part of the art teacher's function to lead in the decoration of the building, to foster plans for mural panels and to push forward their development, to aid in the selection of good pictures for classrooms; good statuary for school halls and good color for schools walls; to aid too on the aesthetic side of school pageants and theatricals. Continual war must be waged against poor taste in posters, in bulletin boards, in the illustrations of the students' magazine. The department must seek to present these lessons in graphic form before great groups of pupils in assembly. It should also bring those prominent in the art world to stimulate students and to identify the department with practical issues outside the school. Similarly, it should seek to bring to the school, material beautiful in itself and appealing to the student. The museums stand ready to loan some of this, while many manu-

facturing interests are glad to aid. Every high school can have, if it will, a little art museum of its own with exhibitions changing from month to month, but never ceasing in their effect upon the life of the school which eddies round them.

17. *To Secure the Co-operation of Outside Agencies.*

Consideration of the principles already outlined will show faith in co-operation and disbelief in isolation. The art department as a whole will ever do its best work as a great communal project and not as a series of unrelated units. Into this work it must bring all of the co-operative agencies it can reach. The museums have been invited to aid and have responded. The schools should in turn support the museum effort. Artists have been brought to the schools and students have also shown their responsibility in the aesthetic training of the city's children. Their continued assistance should be sought. There is a civic implication in all of this. The schools have a duty to perform in the education of future citizens, but many societies must continuously be made to feel that they are bound to aid in this education. Some may provide speakers, some award prizes, some institute scholarships; the means are various, the end is the same. This end is the raising of the aesthetic standards of all who are touched by these activities. It is an end worthy of all the effort that can be brought to bear upon it.

18. *To Interest Industrial Agencies to Aid the Schools.*

Closely associated with the aid to be given by artists and art societies, is the aid which may be secured thru merchants and manufacturers. Much can be done in this way. The manufacturer and merchant can be brought to the schools, and pupils and teachers may together visit shops and trade studios. A double advantage results: On one hand the schools receive the friendly interest and criticism of the business man or practical designer; on the other the service done by the schools becomes known to those who are in the way of using the talented graduate. The problem of the industrial arts is one which becomes more insistent every year. Our city and country together need every ounce of trained talent. Schools and scholarships must be created for this training, and trade opportunities must be opened to the student after he is trained. All of this means the education of the manufacturer and business man, for without the backing of these no industrial art movement can succeed. Thus, there resides, a little understood aid to the success of the art work of the schools in their power to bring to their assistance, elements of the business and industrial world. Careful supervision must concern itself with this.

19. *To Secure Proper Publicity.*

A valuable influence upon the service of any worker is a realization that that service is favorably known outside the school walls. An important function of the department is to bring about this recognition. This has been sought thru the daily and periodical press, and thru various agencies designed to call the attention of those in school circles and those outside, to the outstanding features of the work of individual pupils, teachers and schools, and of the work of the department as a whole. Viewed in the proper light this publicity is in no way to be regarded as an expression of self-seeking or self-praise. Rather, it is a legitimate means of informing those outside the department of the things at which the scheme of art training aims and of the extent of its accomplishments. The interest thus developed has a markedly stimulating effect upon teachers and pupils. Quite as valuable is the sympathy and understanding which is developed on the part of the general public. This expresses itself in many ways, not least of which is the constantly growing desire on the part of editors of both the daily and trade press to spread before their readers, the practical steps taken by the department. Every school can take advantage of this interest by seeing to it that news of its exhibitions, its competitions, its awards and its scholarships are put in the hands of those eager to place them before the general public. Each art department has a responsibility to make its good work known.

20. *To Educate the Public.*

The education of the public is a phase of the department's work closely connected with that described in the last paragraph. It is regarded as an important and necessary service which seeks to make clear to a large and ever-widening circle the aim of practical teaching in the public schools. This aim appears in the fundamental tenet of the department, that: The teaching of industrial art to an industrial people is not a luxury but an economic necessity. To make the significance of this sentence plain is a responsibility which rests with every individual connected with the department. It can be made plain only by continued iteration and continued illustration. The memory of the public is not long. It is therefore necessary, over and over again, to demonstrate in what way art touches the life of our people at every turn, in home and business life. A vital element of the country's progress is dependent on this education. Great art has never come unless there has been a public to support it. Before we can have great art in this country, either fine or applied, we must have an audience which understands it and sustains the artist. Appreciation of the arts is thus essential to their development and the art teaching of our schools can grow only as the public itself grows in knowledge of what this teaching signifies. Every teacher is, therefore, under obligation to become a propagandist in the cause and an aid in enlightening the public thru the press, thru articles, discussions, addresses before societies, and continued demonstrations of practical work. In no other aspect of our work can the individual be of greater service to the group.

One Closing Suggestion: Remember, please, we do not work for ourselves alone; nor even for the pupils of our school, or the public of our city. New York City is a cynosure. Its work is known and studied

by a hundred other cities. We have an unseen audience. Our power for good is not limited by our classrooms. If we raise professional standards, the results are far-reaching. We aid teachers and work in the multitude of places of which we never know. Herein we have a genuine responsibility. We are more than teachers of children. We are teachers of teachers, and teachers of a greater public extending far beyond our ken. To perform this larger service as best we may perform it, should be a matter of continued gratification and pride.

VOCATIONAL COURSES OF STUDY

II. Wood Pattern Making

R. H. Rodgers, Director of School of Industrial Arts, Stout Institute

General Statement.

THE material of the outlined trade courses is presented with certain facts and suggestions in view:

1. Any one of the complete courses covers what a highly skilled and intelligent mechanic should know and be able to do in his trade.

2. The carrying out of such courses depends upon the school facilities which in many cases are limited; consequently it means only the operation and processes indicated under the machines in the local equipment. The completion of any of these courses should not be attempted in less than two years.

3. The tradework should be of such a productive character as not to lose sight of the end point, a skilled, intelligent mechanic.

4. The related technical and trade information should grow out of the immediate practical work and all irrelevant or "dragged in" material discarded.

5. The related vocational guidance information is suggestive for use during the prevocational period and parts of it may well be eliminated in a vocational course.

6. In connection with unit courses of instruction, especially machine shop, it will suggest processes and operations to be covered.

WOOD PATTERN MAKING.

Trade Work.

To obtain immediate and effective results in pattern-making the student should have had, previously, a thoro grounding in the use of practically all the hand woodworking tools. Experience on the lathe, rip, cross-cut and band saws, jointer and surfacer would also aid materially, but if not the course may be carried along, paralleling and fitting into the various types of construction as they are taken up.

The following listed types of construction should be just as largely as possible parts of machines and equipment to be built for school purposes, rather than abstract projects.

1. One piece solid pattern without core prints, bring in principles of draft, shrinkage and finish.
   - Square or rectangular in shape.
   - Note—If students are of an age that they may use machines, instruction either class or individually should be given on the saws, joiner and surfacer.
   - Circular or cylindrical in shape.
   - Note—If students have not had lathe work it will be necessary to give instruction on turning work between centers and on the face plate. Standard core prints, hubs and sprue pins are suggestive problems.
2. One piece solid patterns involving simple coring.
   - Half or full-core boxes.
   - Leaving its own core.
3. Split solid patterns with or without core prints.
   - Turned work.
   - Irregular work.
4. Built up one piece or split patterns.
   - Boxed.
   - Framed
   - Segmental (annular).
   - Staved.
   - Combinations of above types.
5. Built up core boxes, regular or irregular, involving half and complete boxes.
   - Boxed.
   - Framed.
   - Segmental.
   - Staved.
   - Combination of above types.
6. Skeleton patterns.
7. Castings made in core.

Common Steps of Construction for all patterns.

a. Interpretation and reproduction.
   - Interpretation of working drawing or sketch.
   - Layout, full sized reproduction of the working drawing (for all but most simple patterns).

b. Planning.
   - Determination of most efficient way of molding from the molder's, machinist's and pattern-maker's standpoint.
   - Method of construction and routing of operations.

c. Execution.
   - Selecting and getting out of stock to rough dimensions involving use of hand and machine tools and gluing.
   - Accurate layout of material and shaping by hand and machine processes.
   - Assembling, fitting and fastening pieces by means of glue, screws, nails or dowels.
   - Final shaping by hand or machine processes.
   - Finish, involving use of sandpaper and shellac.

RELATED TECHNICAL AND TRADE INFORMATION.

1. Mathematics.
   - Common fractions, decimals, simple equations, equivalents, percentage, ratio and proportion, mensuration and special practical mathematical short cuts.
   - Calculating diameters and speeds of pulleys, gears, shafting, spindles, saws and saw arbors, and revolving work in the lathe. Length of belting in the roll, horsepower of single and double-ply belting.
   - Practical geometry and trigonometry as applied to the laying out of irregular shapes and cuts.
   - Strength of materials as applied to woods, holding powers of glue, screws, dowels, brads, and various types of construction.
   - Use of handbooks for conversion tables, squares, cubes, roots, logarithms and the various formulae.
2. Industrial Science.
   - Elementary mechanics involving the laws of the lever, wheel and axle, inclined plane, screw and wedge with applications to pattern shop problems. Transmission of power by gears, belts, shafting, friction, rope and chain.
   - Composition and tests of glue and shellac, effects of heat and moisture upon them. Effects of heat

and moisture upon woods. Shrinkage of various metals while changing from a molten to a solid state.
Tests for strength and lasting qualities of woods, strength of various types of construction, holding powers of glue, screws, dowels, brads, dogs and fasteners.

3. Drawing.
   Reading of typical shop working drawings to the extent of being able to readily interpret every detail before undertaking the construction.
   Freehand sketching and full size layouts of jobs showing details of construction.
4. Materials of construction.
   Woods of various kinds and grades, their characteristics and adaptability for patternmaking.
   Glues and shellacs of various grades and kinds and their adaptability.
   Screws, nails, brads, dowels, fillets and rapping plates of various sizes and kinds.
   Costs of pattern shop supplies.
5. Shop systems and records.
   Stock room system, time card systems.
   Standardization of hubs, core prints, dowel pins.
6. Patternmaking allowances.
   Allowances for shrinkage in cast iron, cast steel, brass, bronze and aluminum.
   Allowances for draft in various types of patterns.
   Allowances for finish (machine purposes) on various parts of the pattern for different metals and purposes.
   Treatment of heavy and light cross sections coming together on castings to avoid warping or cystallization; distribution of weight, fillets, and rounded corners as a means of solution.
7. Relation of patternmaking to foundry and machine shop.
   Knowledge of principles of molding to enable patternmaker to construct patterns so as to be molded efficiently.
   Knowledge of machine shop practice to enable patternmaker to foresee how machinist will chuck or hold work; amount of finish to be allowed for machining.
8. Factors determining construction.
   Break down or one casting job requiring rough unfinished pattern.
   Standard patterns for permanent use requiring best type of construction and finish.
   Patterns for steel castings.
   Skeleton patterns and other special patterns, their use and construction.
9. Machine tools.
   Location of machines for good light and routing of work, setting and lining up.
   The theory of construction of the various machines; types of drives; an analysis of their efficient operation.
   The theory of setting and grinding knives, setting and filing saws; balancing heads.
   The use and care of various types of motors and starting boxes; simple repair work needed to keep machines in commission.
   General estimate of cost of machines and equipment.
10. Hand tools.
    The use and care of saws, chisels, gouges, planes, spoke shaves, brace and bits, knives, and turning tools.
    The use and care of squares, rules, gauges, dividers and calipers.
    Study of the quality and cost of hand tools.
11. Supplementary sources of information.
    Texts, magazines, advertising material and shop visits.

SAFETY FIRST AND ACCIDENT PREVENTION.

1. Fire prevention.
   Care and disposal of oily rags, waste, dirty overalls, matches, oils and other inflammable materials.
2. Clothing.
   Dangers of loose or ragged clothing, long neckties or apron strings, gloves, celluloid cap visors, collars or goggles.
3. Use of hand and machine tools.
   Dangers of cleaning, oiling, setting and repairing machines while in operation.
   Dangers of unguarded belts, gears, clutches, pulleys, collars, sheaves and exposed set screws.
   Shifting belts, clutches, gears and the throwing in and out of electrical switches.
   Cautions concerning the fastening of work in the lathe or turning pieces before the glue has set, danger in using poor or thin glue.
   Cautions concerning the running of short or poor stock thru the jointer, surfacer or rip saw.
   Cautions pertaining to the use of guards over pulleys, gears, belting and revolving cutting tools.
   Dangers of inside calipering of revolving stock, putting hands on revolving band saw wheels to stop it, running fingers over the heads of used screws, careless use of alcohol lamp.
4. General shop dangers.
   Dangers of oily, dirty and obstructed stairways and passages, blocks on the floor near machines.
   Passing under crane loads, scaffolds, balconies, and ladders.
   Open pits in the shop floor, loose boards, elevator shafts.
   Lumber or other materials poorly piled.
5. Inattention to work.
   Dangers of horse play, scuffling, carelessness, throwing materials and visiting.
6. First aid.
   Care of and attention to all bruises, cuts and burns.
7. Shop sounds and odors.
   Familiarity with sound made by broken band saws, striking of nails or screws on the saws, broken belts and odor of hot bearings or electrical equipment.
8. Legislation.
   Factory laws pertaining to the protection and welfare of the worker.

RELATED VOCATIONAL GUIDANCE INFORMATION.

1. Function of the occupation.
   Relation of the specific occupation to the other trades in the particular industrial organization.
2. Importance of the occupation.
   Numerical place the occupation fills, locally and nationally.
   Value of product turned out, locally and nationally.
   Comparisons with other occupations, using graphic methods to illustrate.
3. Conditions of employment.
   Mental and physical strains involved in the daily routine of the work.
   Specialization and its effect on the worker.
   Dangers involved that must be taken account of; tools, machines, appliances, rigging and scaffolding.
   Welfare work for the improvement of conditions.
   Legislation pertaining to the safeguarding of the worker.
4. Hygiene of the occupation.
   Ventilation and its relation to the health of the worker.
   Fumes, dusts, acids and poisons and their effect on the worker's welfare.
5. Economic conditions.
   Hours and wages of the occupation.
   Average number of working days and income per year.
   Average period of earning ability.
   Comparisons with other occupations, using graphic illustrations.
   Profit sharing schemes, insurance and pension provisions.
   Legislation pertaining to hours and wages.
   Organized or unorganized as a trade.
   Evolution of labor and industry.
6. Entrance to the occupation.
   Age at which occupation is usually entered.
   Various ways of entering.

Apprenticeship and conditions the learner encounters.
Legislation pertaining to apprenticeship.

7. Demands for labor.
   Relation between supply and demand.
   Factors influencing the labor market.
   Ratio between the number of workers in the specific occupation and other related trades.
8. Qualifications for success in the occupation.
   Character of education, training and experience needed for success.
   Personality, attitudes and aptitudes requisite for success.
   Importance of good health, hearing, eyesight and mental and physical alertness.
9. Opportunities for advancement.
   Lines of promotion within the trade or industry and the rewards and responsibilities accompanying them.
   Trade and technical requirements needed for advancement.
   Personality, attitudes and aptitudes contributing to promotion.

ELEMENTARY CONCRETE WORK

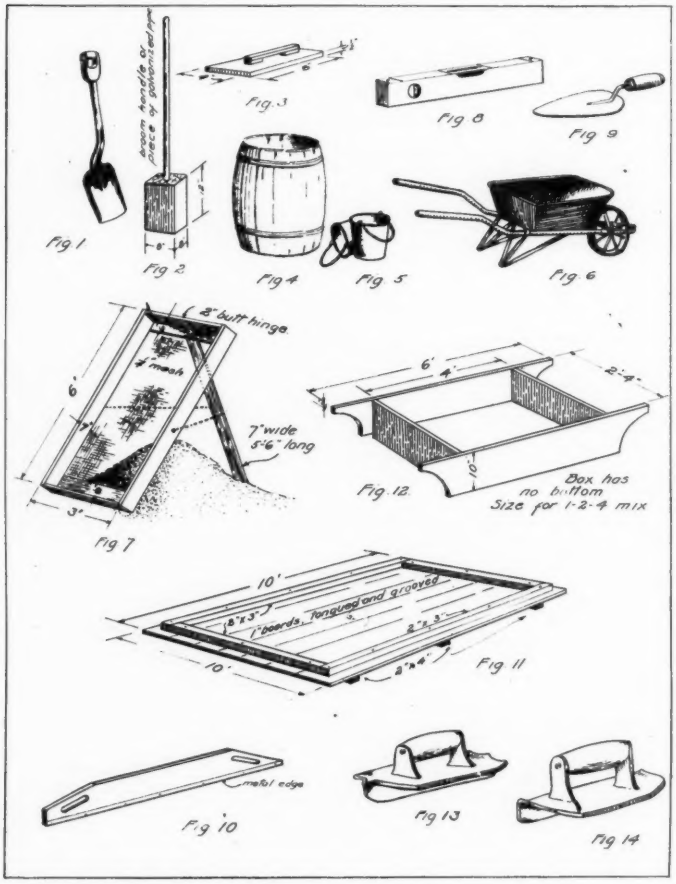
Leon H. Baxter, Supervisor of Manual Training, St., Johnsbury, Vt.

THERE is an old saying, "There is nothing new under the sun." This holds true regarding the history of cement. To many the use of cement is of recent origin, the result of modern methods of construction. Nothing is further from the truth. With the dawn of civilization came the use of cement. Ancient Egypt and Assyria contributed wonderful examples of its use. One notable instance being the Queen's Chamber in the Great Pyramid. The Appian Way and the Pantheon at Rome, together with her aqueducts, are other notable examples of concrete art, some of which are in actual use at the present day.

From the time of the Romans until about 1756, little was done in the manufacture of cement. In 1824, Joseph Aspdin, of Leeds, England, took out a patent for the manufacture of an improved cement and named it "Portland Cement," from the similarity of the product, in color, to a then popular limestone quarried on the island of Portland off the English coast.

Altho European countries began manufacturing cement at once it was not until about 1850 that its commercial success was assured. In 1818 natural cement was discovered in New York State by a man named White, an engineer on the Erie Canal.

The first American mill was built at Rosendale, N. Y., and from this obtained the name of "Rosendale Cement." The first artificial, or true, cement was not manufactured until 1866, and it was not until 1896 that the annual production reached the million barrel mark. The growth of this important industry has increased wonderfully and today individual firms are turning out over 40,000 barrels each twenty-four hours.



EQUIPMENT USED IN ELEMENTARY CONCRETE WORK.

Composition of Cement.

Cement is substantially an artificial stone made by uniting, in very exact proportions, two materials, one of them a rock like limestone, or a softer material like chalk, which is nearly pure lime, with a material like shale, which is hardened clay. These two materials are crushed and ground separately to a fine powder. This powder is carefully mixed and placed in an immense tube-like kiln, about six feet in diameter by 125 feet long which revolves in an intense heat of 3,000° Fahrenheit. Powdered coal is fed in, it taking about 175 pounds of coal to manufacture one barrel of cement.

The result is cement clinker, a dark, porous material resembling lava. This clinker is now reground so fine that the particles are less than 1-200 of an inch in size. It is now placed in storage to season. Cement is placed on the market in bags weighing 94 pounds net and barrels of 376 pounds net, four bags to the barrel.

Cement should be stored in a dry place, for dampness is the one element fatal to its quality. If kept in a damp place the cement becomes lumpy and even solidifies thruout and is absolutely unfit for use. Lumps which do not crumble at the slightest touch should be thrown out. Place the cement on a wooden platform raised several inches from the floor. Never store directly on a concrete floor.

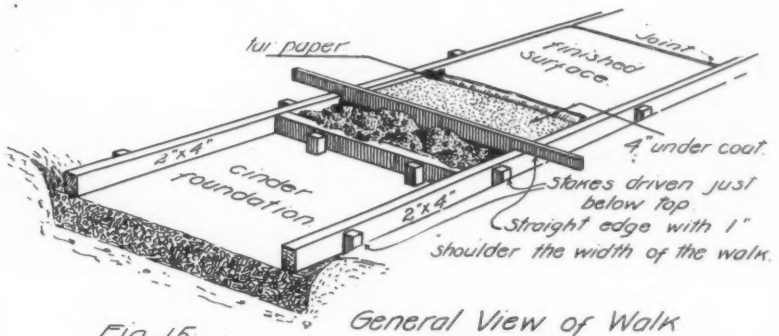


Fig. 15 General View of Walk Construction.

Tools Needed in Simple Concrete Construction.

The necessary implements for almost any job in concreting are as follows, many of which can be of home made construction: A good quality No. 2 square nosed shovel, Fig. 1; a tamper weighing about twenty pounds, made as in Fig. 2; a home made trowel, Fig. 3; a clean water barrel, one which has not previously held oil, Fig. 4; two water pails, galvanized iron being preferable, Fig. 5; a strong metal body wheelbarrow, Fig. 6; a screen for sifting sand, home made, Fig. 7; a carpenter's level, Fig. 8; a mason's trowel, Fig. 9; a straight-edge, Fig. 10; a mixing platform, Fig. 11; a measuring box, Fig. 12; a tool for jointing, Fig. 13; and another for edging, Fig. 14.

Method of Laying a Concrete Walk.

The dirt should be excavated to the depth of about nine inches and at least three inches wider than the proposed walk. This is filled to within four inches of the top with some porous material such as stone, gravel or cinders, the object being to provide a sub-base that will allow all water to drain off, thus preventing freezing and subsequent heaving of the walk. Wet and tamp firmly. The forms should next be placed, care being taken to have the outside curb about one and one-half inch lower than the inner to allow for the surface water on the finished walk to drain properly. Fig. B shows forms in place and sub-base laid. It also illustrates the method of leveling up the forms and shows the tamping of the undercoat and troweling and jointing of the top or finish coat. The forms should be of green lumber, about 2″x4″ pine, fir or spruce being suitable.

The inside face and top edge should be planed. The two opposite curbs should be absolutely parallel. Stakes should be driven in outside the forms to support them. Do as little pounding near fresh concrete as possible. The concrete should usually be laid in blocks with joints between to allow for expansion and contraction. This is done by placing a piece of 2 by 4 between the sides, exactly at right angles to them, and making the slabs about three feet long.

Fill in each alternate square and then go back and fill between, placing a piece of tarred paper or an oiled clapboard between the old and the new work. Leave an inch between the undercoat and top of forms for the topcoat. The undercoat should be roughened and moistened if necessary before placing the topcoat to insure a good bond.

After the topcoat is applied it should not be troweled until it has dried about half an hour, otherwise the steel of the trowel will bring the cement, in solution with the water, to the surface, causing cracks later, and also weakening the whole walk. Joints should be finished with the jointing tool and the edges with the edger. Fig. 15 shows steps in laying the walk.

After the walk is complete it should be protected from rain, sun or frost by either sand, straw or tar paper. The concrete should be wet for three or four days in order that there shall be an even drying out thruout the mixture.

Rough Guide for Selecting Material for Various Classes of Work.

A Rich Mixture: For columns and other structural parts subjected to high stresses or requiring exceptional water-tightness: 1-1½-3 mixture.

A Standard Mixture: For reinforced floors, beams and columns, for arches, for reinforced engine bases subject to vibration, for tanks, sewers, extra strong walks, conduits, and other water-tight work: 1-2-4 mixture.

A Medium Mixture: For ordinary machine foundations, retaining walls, abutments, piers, thin foundation walls, ordinary floors, sidewalks and sewers with heavy walls: 1-2½-5 mixture.

A Lean Mixture: For unimportant work in masses, heavy walls, large foundations supporting a stationary load, for backing for stone masonry: 1-3-6 mixture.

Reinforcing.

Where any great strength is necessary reinforcing should be used. A concrete column will support a tremendous load, but a side pressure of half the magnitude might cause the same column to fall.

Steel is elastic and when properly used with con-

crete imparts sufficient of this elasticity to make an ideal building material.

Reinforcing is obtained in two general types, either steel bar or wire mesh. Where a large amount of reinforcing on heavy work is required, rods should be used. For flat work requiring less strength, wire mesh or in some cases any kind of wire is suitable. An invariable rule in placing reinforcing is to insert where the pull will come. Thus in a beam or slab it is close to the bottom, while in a wall built to withstand earth pressure it is placed in the face nearest the earth.

It is well to say a word here regarding the use of the words cement and concrete as they should be spoken. We often see and hear of cement walks, cement houses, cement steps, etc. This is extremely incorrect. The proper word to use is concrete. There never can be such a thing as a cement house, etc. It must be remembered that cement is but a powder and has the same relation to concrete that flour has to bread, and is only a part of the finished product.

Aggregates.

As a chain is no stronger than its weakest link, so concrete is no stronger than the weakest particle of which it is composed. The materials entering into the composition of concrete, such as sand and gravel, are called the aggregates, sand being the fine and gravel the coarse aggregate. If good results are to be obtained extreme care must be taken in selecting these. They should be clean, hard, coarse and well graded. Clean, so that the coating of cement may adhere directly to the particles. Coarse, because coarse aggregate is more easily covered with cement than a fine one. Hard, so that it may retain its form under pressure.

Fine Aggregate. Aggregate passing thru a sieve of one-fourth inch mesh is called sand. It should be sharp and free of all vegetable matter. A fair test for quality of sand is as follows: Take two handfuls of moist sand, and holding the palms about one-half inch apart let the sand run thru. Repeat this several times and then rub palms lightly together to remove fine grains. Examine to see if a fine, sticky film adheres to the palms; if so, do not use as it contains loam. Fine roots also indicate vegetable matter. Another test is to fill a fruit jar to the depth of four inches with sand. Fill with water to within one inch of the top, shake well and allow to stand for a couple of hours. Sand will sink to the bottom while any mud or clay will settle on top of the sand. If more than one-fourth inch of such a deposit remains it is not suitable for use without washing.

As a general rule the ordinary run of bank gravel is not suitable for use without sifting and remixing, as described later, in proper proportions. This is because there is almost always too much sand for the gravel.

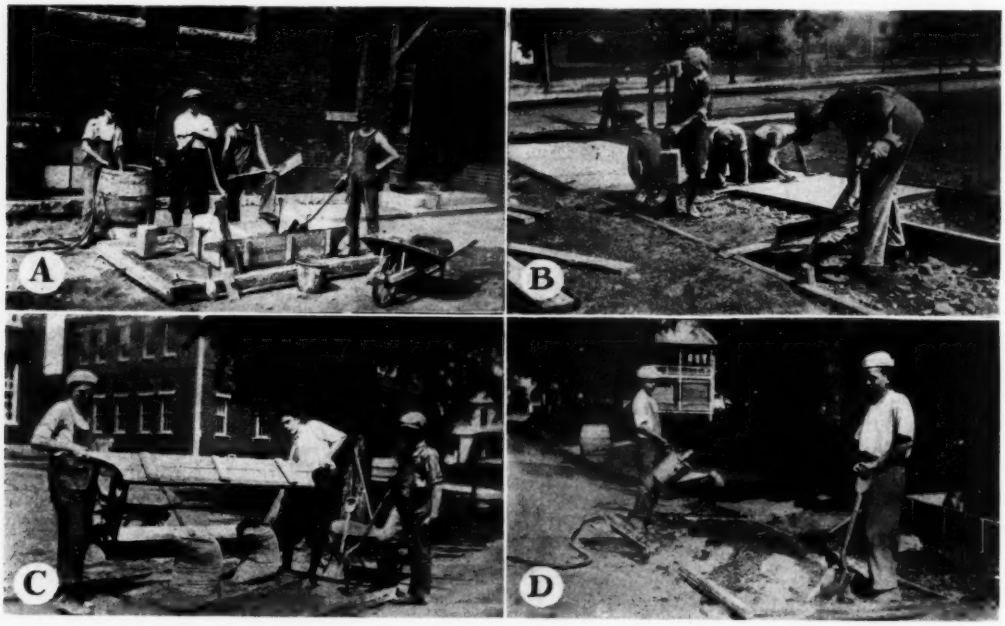
Coarse Aggregate. This should be clean and hard. The best results are obtained by a mixture graded from small to large, as it forms a more compact mass. Granite, hard limestone, trap rock and hard gravel give the best results.

Water. Water used should be clean and free from acids and alkali.

Mixing.

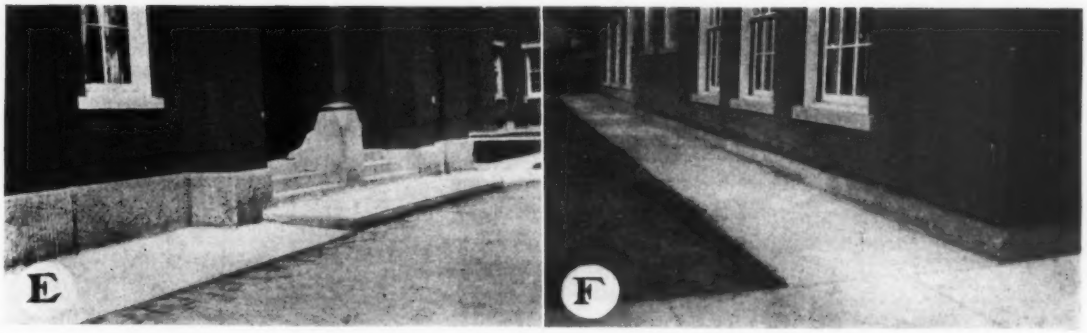
After proper sand and gravel have been secured the success or failure of the finished job is in the proper mixing. Have all gravel and sand placed convenient to the work. Fig. C shows method of sifting.

The use of the measuring box is important. For a 1-2-4 mix, which is an average mix, a box the size of the one shown in Fig. 12 should be used. This is



PART OF THE AUTHOR'S CLASS AT WORK

A—Typical Outfit for School Work. B—Laying Concrete Walk. C—Removing the Measuring Box. D—Sprinkling a Batch.



PLATFORM AND WALK MADE BY THE AUTHOR'S CLASSES

filled half full of sand and once full of gravel, together with two bags of cement. See Fig. D which shows box half full of sand and with two bags of cement. While mixing it is a good plan to work the mass back and forth from one end of the mixing platform to the other at least three times to insure a uniform distribution of materials. See that there are no hard lumps or cement "pockets" remaining.

Cup out the pile in the center, and by means of buckets, add water, at the same time working the dry mixture up from the edges toward the top, see Fig. E, until the water starts to run over. Turn the batch, now, from one end of the mixing platform to the other until the mass is thoroly moistened and just thick enough to bear a man's weight. Never use a hose to apply the water, as it will wash away the fine cement, and distribute it unevenly thru the mixture. A large watering can provides a good means for applying the last of the water, Fig. F.

After the cement and sand are properly mixed, level up the pile and place the measuring box on top of it, just allowing the box to rest lightly on the surface of the mixture. Wet down the pile of large aggregate thoroly and place enough in the measuring box to just fill even with the top. Remove the measuring box as before, and carefully mix with the first batch, being sure the broken stone (large aggregate) is thoroly coated to insure a good bond.

The finished mixture should be placed in the forms at once and tamped until fairly level, and within an inch of the top of the forms. This is followed at once by the top or finish coat. The finish coat is laid one inch thick, and is composed of equal parts of sifted sand and cement. After spreading this over the undercoat it is leveled with a straightedge drawn across the edges of the forms and allowed to dry for about one-half hour, or until the surface looks free of water, and then finished with a trowel.

To the beginner the knack of using a trowel properly may seem a little difficult and the work show the imprints of the trowel edge. Use a wide, sweeping motion with a little pressure on the near edge of the trowel and the outer edge very slightly raised. In bringing back the trowel reverse the pressure.

To show the practical use to which a slight knowledge of concrete can be put, the photographs show work done by the author's pupils in the eighth grade.

During the past two years about 8,000 square feet of concrete have been laid for the school department in and about the school buildings of St. Johnsbury.

JUST A JOB.

Is it just a job that is yours to hold,
A task that offers you so much gold,
Just so much work that is yours to do,
With never a greater goal in view?
What do you see at your desk or loom,
Or the spot you fill in life's busy room?
Merely a flickering lamp that burns
With a sickly light as the mill wheel turns
And the same old grind in the same old ways
With all the to-morrows like yesterdays!

Is it just a job, just a task to do,
So many pieces to build anew?
So many figures to add, and then
Home for a while and back again?
Are you just a clerk in a gaudy shop,
Pleased when a customer fails to stop,
Finding no joy in the things you sell,
Sullenly waiting the quitting bell?
Are your thoughts confined to the narrow space
And the dreariness of your present place?

Is it just a job, or a golden chance?
The first grim post of a fine advance,
The starting place on the road which leads
To the better joys and the bigger deeds,
Do your thoughts go out to the days to be?
Can your eyes look over the drudgery
And see in the distance the splendid glow
Of the broader life that you, too, may know?
What is your view of your circumstance,
Is it just a job or a golden chance?

—*Edgar A. Guest.*

STANDARDIZED MEASUREMENT SCALES IN THE FIELD OF THE INDUSTRIAL ARTS

Frank M. Leavitt, Associate Superintendent in Charge
of Vocational Education, Pittsburgh, Pa.

MANY years ago in speaking to a body of teachers, Professor William James, the eminent psychologist, said that teachers did not need to have extensive knowledge of the subject of psychology in order to excel in their profession. Skill in teaching, he said, grew up around schoolroom practice. He said, however, that psychology was an interesting subject in itself and he expressed the hope that many of his hearers might feel inclined to study psychology because of this inherent interest and might find that the study would also add to their interest in the problems of education.

Precisely the same thing might be said today with regard to the study of standardized tests and measurement scales as they are being developed in the field of education. For years to come some teachers may remain ignorant of the principles on which these scales are developed and yet be excellent teachers. On the other hand a study of a few of these tests, no matter how superficial that study may be, will have the effect of making almost any teacher critical of his own work and will influence him to examine intelligently and with discrimination the real results of his instruction.

Quite naturally it is in the field of the older subjects in the curriculum that the more complete tests and scales have been developed. Standard scales are used to measure the attainment of pupils in arithmetic, reading, spelling, handwriting and English composition. In the fine, industrial and household arts little has been done that is worthy of note or at least little that has become widely known or is widely utilized. This paper on the development and use of measuring scales is written primarily for teachers of the practical arts whose attention may not have been called to the recent rapid development of the subject and is not addressed to "measurement experts." It is neither technical nor exhaustive but it is hoped that at least an initial interest may be aroused and that experimental work may be stimulated.

Development and Use of Measurement Scales.

Let us approach the question of measurement scales, in the field of the practical arts, in the spirit of humility that so little has been done by us in establishing standardized scales but, also, with such an appreciation of the limitations within which such scales may be employed as will give us a certain satisfaction that we have not been stampeded into an attempt to measure *something*, without any clear idea of what or why.

For example we may note that while a number of standardized measuring scales are not available for use in our schools, the number of such scales is not considerable when compared with the number of educational activities which go to make up an efficient school system. A school, therefore, might utilize every known standard scale and yet leave unmeasured its most precious and priceless educational work.

Teachers of the practical arts, however, may possibly be accounted conservative or even reactionary if they fail to inform themselves with regard to the measurement movement, or if they refuse to undertake some experimental work in the attempt to standardize and to measure attainment in the fine, industrial and household arts. Practical arts teachers will do well to consider some of the things that have been accomplished already in other fields. This article presents only an introductory discussion of the subject and the reader is advised to consult one or more authorities on measurement and to study results attained in a few of the standardized tests which have been widely used.*

As a brief and introductory statement of the case it may be said that standardized measurement scales are developed by means of a series of objective studies of a considerable mass of material relating to common or comparable practices.

In the light of the above statement it should be obvious that measuring scales cannot be developed for testing dissimilar activities. For example, if the children of New England were taught only addition, those of the Atlantic States only subtraction, those of the South multiplication, those of the Middle West division, and those of the Pacific Coast percentage, it would be difficult to devise a measuring scale which would enable us to compare the efficiency of arithmetic instruction in the different sections of the country. Unless there are common practices or common objectives, therefore, the measurement scale is well nigh impossible.

The efficiency of tests depends upon the universality of their application; upon the low percentage of variability with which the results may be scored or evaluated by the examiners; upon a widespread interest in them and consequently a wide-

Note—The purpose of this article is to ascertain whether or not a considerable number of our readers are alive to the rapid progress that is being made in the development of standardized measuring scales for evaluating the work that is done in various school subjects, and whether or not our industrial arts teachers are interested in learning about and in helping to develop standard scales for measuring accomplishment in our particular field of endeavor. If such should be the case the *Industrial-Arts Magazine* is ready to act as a clearing house for ideas on the subject and to further in any way possible experimentation in this field. If this article interests you, or if you have done any work in this line and wish to contribute to the discussion, let us hear from you.—*Editor.*

*See "The Scientific Measurement of Classroom Products," by Chapman and Rush. Silver, Burdett & Co.

spread use of them. A test must be devised, therefore, that may be given in any locality and under the most ordinary school conditions. There would be a peculiar value in devising a test that might be given to the pupils who have had little or no school training in the field of the practical arts as well as to practical arts pupils, thus making it possible to compare the ability of those who have had special training with those who have not.

A fact of first importance should be noted here, namely that tests test only the things which they actually test. It is implied with too great frequency that a given test may indicate *general* excellence or *general* mediocrity or *general* failure in a realm of activities of which the particular activity tested is only a minute part. A Courtis test in addition does not necessarily indicate the degree of mathematical ability possessed by the one tested; it only measures his achievement in addition. It is imperative, therefore, that we fix upon the particular quality or ability which we wish to measure before attempting to develop a scale.

Methods of Producing and of Using Standardized Measuring Scales.

There are several methods of developing standardized measuring scales, two of the simplest of which will be briefly outlined below.

One method: A large number of samples, let us say one thousand, of the performance of children in a common activity, for example handwriting, are collected. These samples are arranged in order of their excellence as to appearance or as to legibility, from the best to the poorest, with the best at one end of the scale and the poorest at the other. Assuming that the "steps" in excellence are equal, selections are made at regular intervals—let us say every hundredth sample. These selected samples constitute subdivisions of the scale more or less minute according as there are many or few shown, just as it is possible to sub-divide a foot rule into inch, quarter inch or eighth-inch graduations as may be preferred.

This furnishes merely what might be called a "legibility scale." The question of speed is still to be taken into account in measuring the degree of excellence of a given specimen of handwriting. The specimen to be measured is compared with various samples in the scale until one is found that is equal to the specimen in point of legibility. This places the specimen at, let us say, 75 in the scale of 100.

Another method: A question sheet is arranged consisting of a number of problems in the subject in which the pupils are to be tested, increasing in difficulty from question one, which is extremely simple, to the last question which is intended to be extremely difficult but within the capacity of the most advanced pupils for whom the test is being developed. A pupil who can solve only one-half the problems scores only one-half as high as one who can solve them all. A correction may be made for speed by limiting the amount of time allowed. If such a test as this be given to a sufficiently large group of pupils ranging, let us say, from the first to the eighth grade inclusive, it would be found, presumably, that the first grade would solve the fewest problems and the eighth grade the largest number. In this way a norm would be established for each grade. Other fourth grades would be considered normal if they solved, on an average, approximately the same number of problems as were solved by the fourth-grade pupils, on an average, in the large group.

How May We Measure Accomplishments in the Practical Arts?

It is desirable at this point to consider briefly three questions with relation to objective studies as follows: What is meant by an "objective study?" Why are such studies esteemed by measurement experts? What limitations are to be noted regarding objective studies considered as a basis for organizing courses of study?

By an "objective study" is meant the observation of a series of actual and pertinent facts relating to the subject to be studied and the recording and collating of these facts in such a way as will make it possible to draw definite conclusions which grow directly and unmistakably out of the facts. The four steps to be taken in making an objective study, therefore, are observe, record, collate, conclude.

Measurement experts esteem such studies because the conclusions do not rest upon opinion, which is variable, but upon fact. A scale based upon opinion merely would be analogous to an elastic tape measure. From the point of view of the scientific measurement expert, opinion should be eliminated altogether or recognized as affecting merely the interpretation of data.

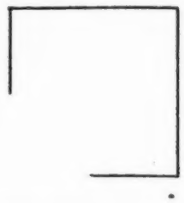
There are certain limitations that must be noted when it is proposed by our measurement friends that the organization of a course of study be based largely upon an objective study of what is actually being done in that subject. In the first place the advocate of the objective study frequently underrates the value of opinion. He says, "I do not want opinions. I want facts." He overlooks the fact that there is a time in every human movement when opinion is of greater importance than any known or demonstrable facts. The discovery of America was made by Columbus because he held an opinion which no collection of facts at that time could have demonstrated to be sound. In almost any pioneer situation it is more than probable that someone's opinion is worth more than any possible "objective study." In the pioneer situation, therefore, the "personal equation," the individual judgment, the concensus of opinion are all factors which should be taken into account.

The significance of all this for the subject of measurement scales in the field of practical arts instruction should be obvious. It is only when practices themselves have become somewhat common or

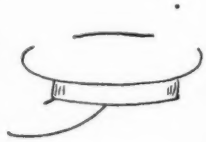
NAME BOY GIRL GRADE

Problem 1. Finish Drawing

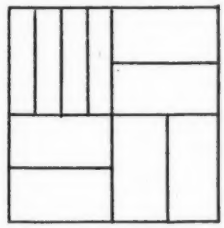
Problem 2. Finish Square



Problem 3 Finish drawing



Problem 4 Finish drawing



Prob. 5. Sew through dots A-B-C-D-E-F-G.

•A

•B

•C

•D

•E

•F

•G

Prob. 6. Paste four squares between lines. Begin at left. Have edges touch.

Prob. 7. On line H-K prick dots as shown and so on to end of line.

H K

Prob. 9. Place corner marked L on dot beside O, crease paper, then unfold paper.

O

Prob. 10. Place edge PL on crease just made. Then crease paper.

Prob. 8 Finish drawing of star.

Prob. 11. On line M-N prick points one half inch apart Use rule.

M N

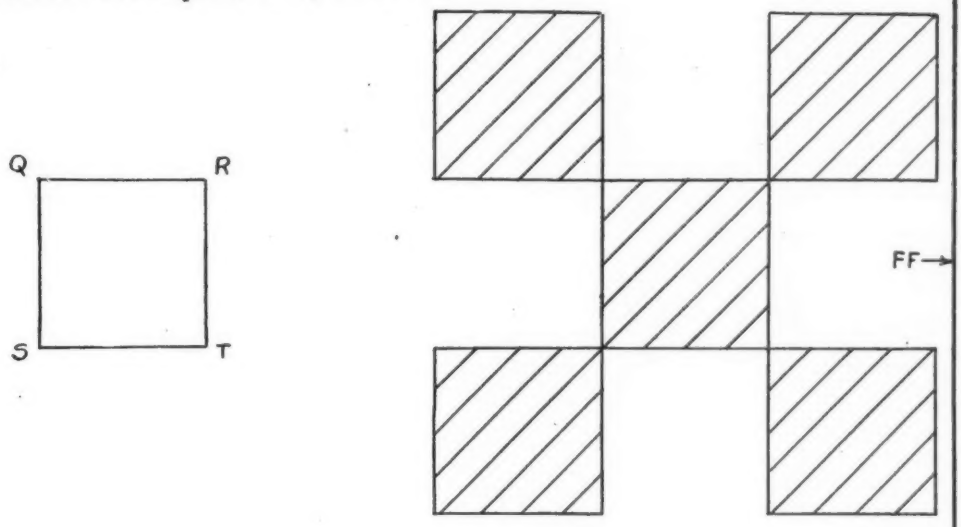
Prob. 12. Paste three paper squares one quarter inch apart, top edge touching given line. Begin at left. Use rule.

P L

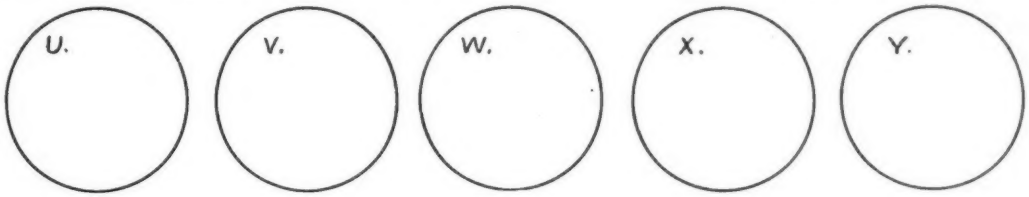
PAGE 1 OF MEASUREMENT SCALE FOR MANUAL ARTS, AS PREPARED FOR CLASS USE.
The reverse, which is omitted here for lack of space, contains a key for scoring.

NAME BOY GIRL GRADE

Prob. 13. Paste five paper squares like sketch. Centre square to be pasted on square Q-R-S-T.



Prob. 14. Prick through centers of circles U-V-W-X-Y.

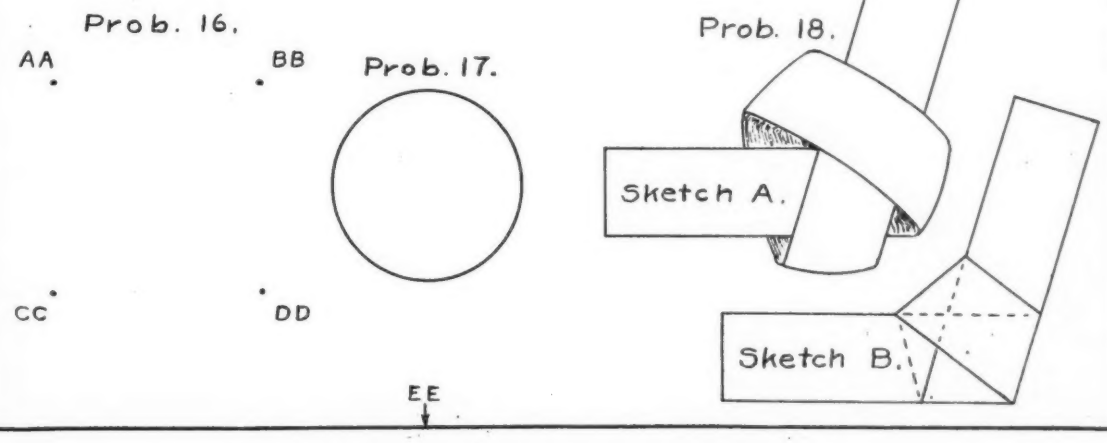


Prob. 15. Fold paper so that points EE-FF are connected by a crease.

Prob. 16. Sew through dots AA-BB-CC-DD. to form square

Prob. 17. Put needle through center of circle and bring out on circumference.

Prob. 18. Tie strip of paper into a knot as in sketch A. Finish to look like sketch B. Pin knot to paper.



PAGE 2 OF STANDARD MEASUREMENT FOR MANUAL ARTS.
The reverse of the sheet, which is omitted here, contains the key for scoring the pupils.

"standardized" that we can subject them to measurement by a standardized scale. Also the purpose for which the subject is taught must be recognized. All will agree that in testing handwriting, speed and legibility comprise practically the whole objective of handwriting instruction. The objectives of instruction in arithmetic are more complicated, yet speed, accuracy and problem solving ability sum up these objectives fairly well. Reading is still more complicated as to objectives, yet few will disagree that the objectives of reading are more easily analyzed and are more universally agreed upon than are the objectives of drawing or of so-called industrial education.

The writer is of the opinion, unsupported as yet it is true by any objective study, that our first step in developing measurement scales in the field of the practical arts must be to define and agree upon our objectives.

In the January number of the *Industrial-Arts Magazine*, page 1, will be found a list of objectives that have been suggested as worthy of general acceptance by those who are teaching or directing the work of the fine, industrial or household arts in the public schools. For convenience the list of objectives or purposes is repeated here.

1. To develop handiness.
2. To promote the immediate carrying over of ideas into action.
3. To help discover special interests and aptitudes important for vocational guidance.
4. To provide a means for developing technical skill.
5. To provide a means for imparting technical knowledge.
6. To enable the pupil to apply the test of practice to some of his thinking.
7. To develop the mind by providing constructive problems, in materials, which demand a vigorous mental reaction.
8. To interest in school work those pupils to whom the traditional studies do not appeal strongly.
9. To create interest in the arts and industries without any reference to their vocational significance.

It is suggested that a test be developed for measuring attainment with regard to only one or two of these objectives and it is further suggested that we select Purpose No. 1, namely, "The development of handiness," or Purpose No. 7, which we may say describes the "problem solving" ability, for our initial experiments in the field of scientific measurement.

One test only is described herewith. It has not been tested thoroly as yet but it is submitted, nevertheless, for the consideration of the readers of the Magazine. In fact the purpose of this article is to discover how much interest there may be among the teachers and directors of the fine, industrial and household arts in this subject of measurement scales. If this interest proves to be sufficiently great, the *Industrial-Arts Magazine* proposes to serve as a clearing house in this field and, as a beginning, to conduct some initial experimental work in conjunction with the Pittsburgh public schools.

The test described in this article is offered as being illustrative of certain of the principles upon which objective scales are based, and of some of the steps which must be taken in working out such scales if they are ever to be brought to the point where they may be said to be "standardized."

At the outset it should be understood that a genuine scale can not be "invented," tho inventive genius may be helpful in devising the methods of making and refining it. A scale must be *developed*. The test suggested in this article is merely a *preliminary* test from which it may be possible to develop first, a *tentative scale* and second, in due time and after considerable co-operative work, a thoroly tested, *standardized scale*. The only possible immediate result of this first article will be to secure a considerable mass of crude data for subsequent study.

Furthermore, it should be remembered that it is not proposed, at this time, to suggest tests for the measurement of any specialized abilities in the realm of the practical arts such, for example, as "artistic ability," "mechanical ability," or "ability in cooking." These may come later but it is probable that years of study and experimentation will be necessary before we can develop scales by which we can test, even imperfectly, the great diversity of abilities or achievements comprehended in the school activities commonly called drawing, manual training, cooking and sewing.

The test suggested is intended to help us to measure an ability which plays some part in, and probably is developed by each of these school activities. This ability we have designated as "handiness" or "deftness." Therefore, while the test makes use of pencil and paper and while some of the "problems" have the appearance of drawing exercises it is not the knowledge of drawing principles, or even the ability to draw that the test is planned to measure.

The test itself is an adaptation of the principles which underlie the Woody arithmetic tests. It is composed of a number of problems or tasks so arranged that they increase in difficulty from the first, which is simple enough for some first or second grade pupils, to the last which is difficult enough to tax the utmost skill of many eighth-grade pupils and to be beyond the ability of some. The tasks present difficulties in manipulation, not difficulties in the comprehension of what is to be done.

If the test suggested actually proves to be all that we desire, the steps in difficulty will be equal steps, quite as the twelve one-inch graduations on a foot rule are all equal. Whether or not task No. 3 really is more difficult than task No. 2, and whether it is more difficult to just the same degree that No. 4 is more difficult than No. 3 can be determined only

by trying it out with a large number of children of all the grades in question.

The first piece of co-operative work to be done, therefore, by the readers of the *Industrial-Arts Magazine*, is to agree with the Publishers to secure a sufficient supply of the tests, to administer the tests and to score the results in accordance with the directions given herewith, and to send the scores to the *Magazine*. The tests and score cards will be furnished at a nominal cost in accordance with the prices given by the Publishers.

When a sufficiently large number of returns have been received to make their tabulation significant, a second article will be prepared showing the method to be employed to "test the tests." Of course the significant results of the test will be given to the readers of the *Magazine*. Further work will then be outlined for refining the test until we may be justified in calling it a "scale" for the measurement of handiness or deftness in the elementary grades.

In conclusion a few general comments may be made which, it is hoped, will make the whole subject a little more clear.

The chief requisite of an objective scale for the measurement of accomplishment or ability is that its units of measurement remain constant and that they can be affected no more by the judgment of the one who measures than can the inches on a foot rule.

Such scales have always required much time and much tentative use before they have become accepted as "standard." The best that can be hoped for in this preliminary effort is that a mass of crude data may be secured and that from these data some "tentative standards" may be developed, which standards may then be submitted to still further tests. It is only by this process of refining that a genuine "scale" can be completed. The fact that the process is long and tedious should not deter us from making a beginning.

One criticism of the test almost certainly will be made by some teachers, namely that the problems or tasks are too difficult for the children to accomplish within the time limit. The authors of "The Scientific Measurement of Classroom Products" have met this kind of criticism by the following comment:

"In this connection it cannot be pointed out too clearly that when scales of this type are used in the schools it is not expected that the children will be able to do all the problems, just as when we determine the height of a child by means of an eight-foot rule, we do not expect the child to measure up to the eight feet."

DIRECTIONS FOR GIVING THE TEST.

It is absolutely essential that the test be given to all the pupils under conditions as nearly identical as possible. The teacher administering the test should follow directions exactly.

Before beginning the test have all material distributed. For each pupil provide (1) a sharp pencil; (2) one-foot rule graduated to at least quarter inches; (3) a needle and at least 24 inches of thread. Have needle threaded before beginning the test; (4) twelve one inch squares of gummed paper; (5) one pin; (6) one strip of paper 12 inches by one inch; (7) the two test sheets.

Have the papers distributed last and placed on the desk face downward. Do not permit the children to turn the papers over until the signal for doing so is given.

Tell the children to be industrious but not to hurry. Tell them that the time will be limited to 20 minutes. Tell them that it is hardly to be expected that any child will finish all the problems. With a watch before you, tell the children to turn over the papers and to listen to you while you read and explain the problems. Take ten minutes in which to read the problems twice distinctly and to make such explanations as are necessary. In making explanations merely try to make quite clear *what* is asked for. Make no allusion as to *how* the work is to be done. In no case should more than ten minutes be given to the combined reading and explanation.

After reading the problems aloud say to the class:

"Write your name."

"If you are a boy underline *boy* and if you are a *girl* underline *girl*."

"Write the number of your grade."

"Take pencils and follow instructions as printed."

At this point the test has begun.

No word should be spoken and no assistance given thruout the test. At the end of the 20 minutes say "Stop" and insist that no work be done after that signal.

Collect papers.

DIRECTIONS FOR SCORING RESULTS.

Score each problem or task as definitely right or definitely wrong.

Prob. 1 Score as correct if direction of curve is followed accurately and smoothly; wrong if lines do not connect with those of the drawing or if they are broken or straight.

Prob. 2. With needle prick thru the penciled corner. If this comes within the small circle on the reverse side, score as correct.

Prob. 3. Same as 1.

Prob. 4. If the number and the direction of the added lines are right, score as correct.

Prob. 5. If the pricked points coincide with the dots on reverse side of paper, score as correct.

Prob. 6. If the needle punctures the line at each point, score as correct.

Prob. 7. With a needle, prick thru the two penciled points of the star. If these pricked points coincide with the dots on reverse side of paper, score as correct.

Prob. 8. If the crease coincides with line marked X on reverse side of paper, score as correct.

Prob. 9. If the edge exactly coincides with the crease, score as correct.

Prob. 10. If the printed horizontal lines are clearly dis-

For convenience in scoring the results of the test, make use of a score sheet arranged as follows:

SCHOOL..... *GRADE*.....

PUPILS' NAMES	PROBLEM NUMBERS																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Check thus √ when correct.

For reporting the results of the tests to the Magazine, make use of report blank arranged as follows:

SCHOOL SYSTEM.....

NUMBER OF TIMES EACH PROBLEM WAS SOLVED CORRECTLY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Grade I																		
Grade II																		
Grade III																		
Grade IV																		
Grade V																		
Grade VI																		
Grade VII																		
Grade VIII																		

Write under 1 a figure, as 6, indicating the number of times that problem No. 1 was solved correctly by children of the grade in question.

cernible on both sides of the squares and if the edges of the squares exactly touch each other, score as correct.

Prob. 11. With a needle, perforate the paper at each lower corner of the three pasted squares. If these points coincide with the dots on reverse side of paper, score as correct.

Prob. 12. With a needle, prick thru the paper at the outermost corner of the four pasted squares. If these points come within the small circles on reverse side of paper, score as correct.

Prob. 13. If all of the pricked points come within the small circles on the reverse side of paper, score as correct.

Prob. 14. If the crease coincides with the line on reverse side of paper, score as correct.

Prob. 15. If the needle punctures all of the dots accurately, score as correct

Prob. 16. If the needle punctures all of the dots accurately and the thread forms a complete square, score as correct.

Prob. 17. If the needle passes thru the dot on reverse side of paper and also punctures the circumference, score as correct.

Prob. 18. If all intersections are exact, score as correct.

PROBLEMS IN RAFFIA

Edward F. Worst, Supervisor of Elementary Manual Training, Chicago

IN our haste to secure results a knowledge of the materials used is often overlooked.

What is raffia and where does it come from?

Scores of children and often teachers are laboring under the impression that raffia is nothing more than a kind of grass or hay as some children have been known to call it. Raffia is not a grass but is the stripping or outer covering of a particular kind of palm leaves. At a certain time in the year this outer covering or epidermis is easily separated from the inner part of the leaf. It is then that the natives of Madagascar devote considerable time in stripping great quantities from the leaves, drying and packing it in great bales to be exported to various countries.

Raffia is not only used in basketry but is also used in great quantities by florists.

Raffia is readily dyed, almost any desirable shade. Before dyeing, however, it should be thoroly washed and before using in any form of stitchery or knotting should be dampened and kept damp by rolling it up in a newspaper or towel. If used dry it is very apt to split into shreds, thus making it very difficult to use, especially by children.

In the past most impractical problems were constructed of raffia and as a result the child's labor very soon found its way to the waste basket. The purpose of the following suggestions is to lead teachers and pupils to construct a few simple problems involving the use of raffia, not only in itself but in conjunction with reed, thus introducing several of the most used Indian stitches.

Knotting—Solomon's Knot.

Before beginning the real construction of any particular problem the knot or stitch to be used must first be understood. The first to be considered is the knot known as "Solomon's Knot."

Tie a piece of raffia around a rectangular piece of cardboard as shown in Fig. 1. Over this piece knot two strands of raffia as shown at C and D, Fig. 1. This is done by placing the two ends of a strand together, thus forming a loop at the center as shown at A, Fig. 1. Bring the loop under the strand

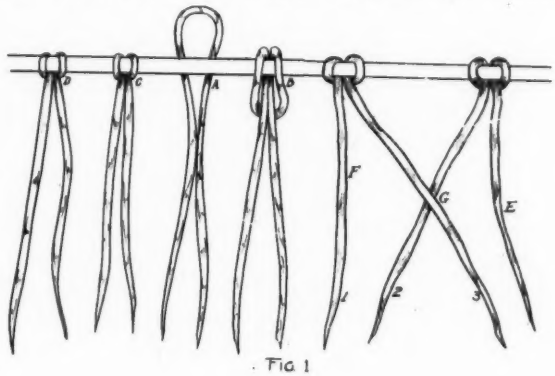


FIG 1

of raffia which was tied around the cardboard A, Fig. 1. Pass the two ends up thru the loop as shown at B, Fig. 1, pulling them down until the loop is held close to the strand C and D, Fig. 1.

In making bags the knotting is done working from left to right. Leave one strand on the left edge E, Fig. 1. Strands two and three are held with the right hand at G, Fig. 1. E is now laid across G and

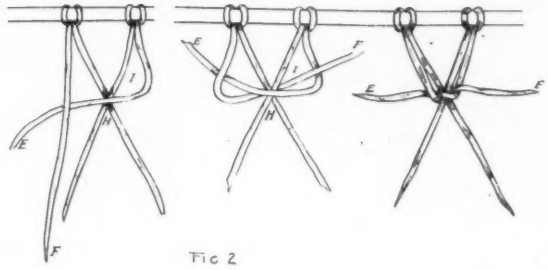


Fig. 2

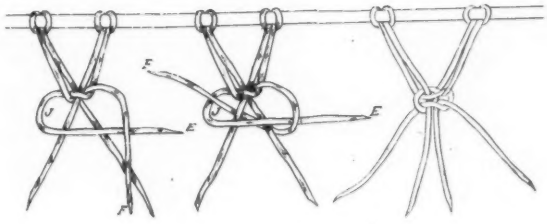


Fig. 3

also held in place by the right hand as shown at H, Fig. 2, leaving a loop as shown at I. F is now placed so it hangs over E, Fig. 2. F now passes under the cross at H and thru the loop I, center drawing, Fig. 2.

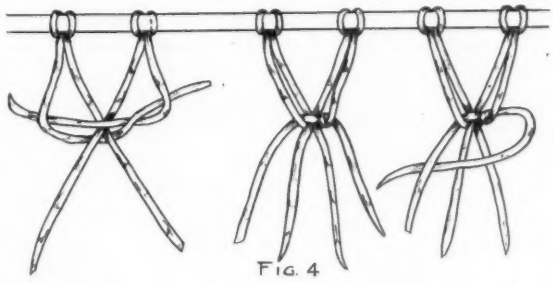


Fig. 4

E and F are now pulled, one with the left and the other with the right hand. The drawing to the right, Fig. 2, shows the result.

Strands E and F are now used in completing the knot. E is laid across the two center strands, Fig. 3, and the loop "J" is formed. F is now placed so it hangs over E as shown in left drawing, Fig. 3. F now is brought up under the center strands and thru the loop "J" as shown in the center drawing, Fig. 3.

E and F are again pulled one with the left and the other with the right hand. Pull both at the same time. The drawing at the right, Fig. 3, shows the completed knot.

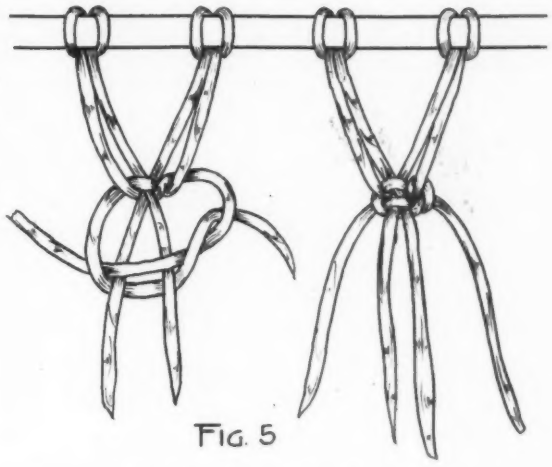


Fig. 5

Figs. 4, 5 and 6 show drawings of the same knot with a slight modification. The end instead of being brought under and up thru the loop is brought under the two central strands and up and then down thru the loop as shown in the drawing at the left, Fig. 4 and Fig. 5.

Fig. 6 shows three knots in the first row and the way the knots are started in the second row.

Twine Holder.

In constructing the twine holder it is of the greatest importance to have on hand the ball of twine for

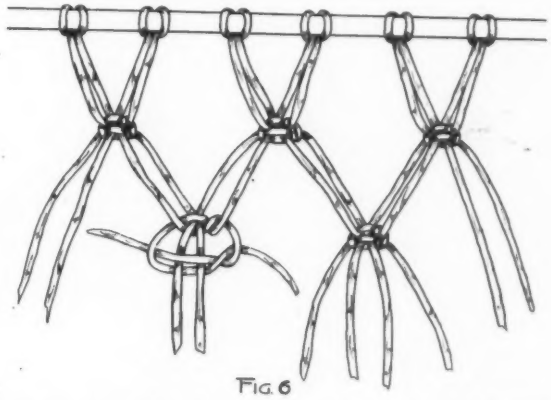


Fig. 6

which the holder is to be constructed. Find first the greatest circumference of the ball and cut a rectangular piece of cardboard measuring in width one-half the circumference of the ball and a length of six inches. For example if the circumference of the ball is found to be nine inches, cut the cardboard four and one-half inches in width and six inches in length. On each six-inch length, close to the upper four and one-half inch edge, cut notches; use two good strands of raffia for draw strings. Place one strand around the cardboard and tie in the left-hand notch and draw the other around so it ties in the right-hand notch as shown to the left in Fig. 7. Select sixteen or eighteen smooth strands of raffia and loop them as shown in Fig. 1, over the strands used as drawstrings, eight on one side and eight on the other as shown in

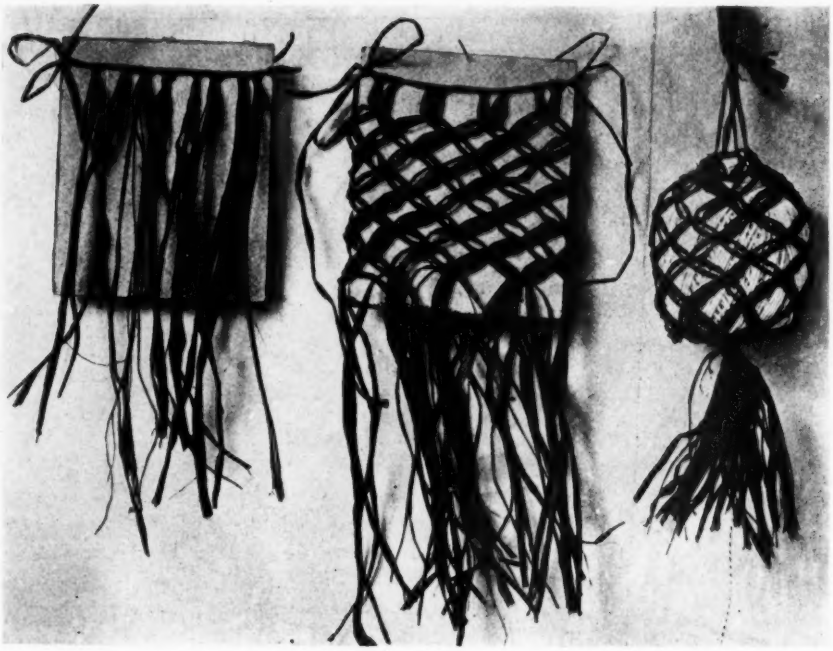


Fig. 7.

left plate, Fig. 7. This accomplished, the knotting is done as described in Figs. 1, 2 and 3. The knotting continues around the cardboard. In the second row the right hand strands of one knot and the left hand strand of the next are used as shown in Fig. 6.

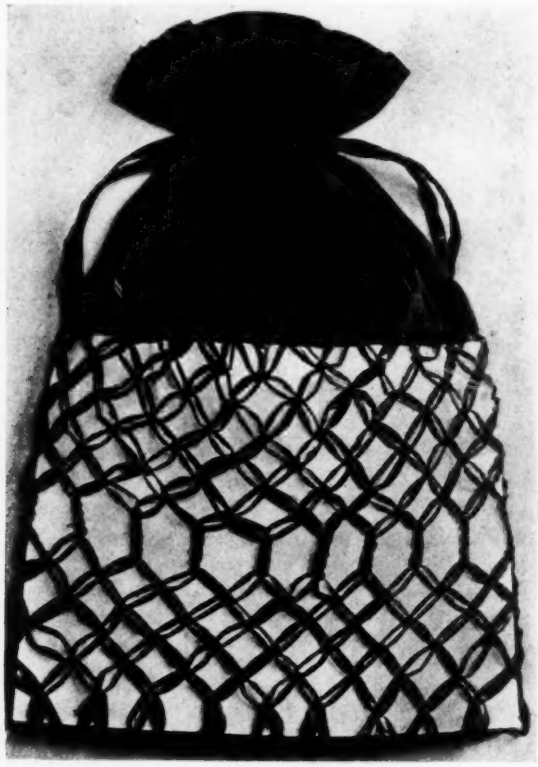


Fig. 8.

The center plate, in Fig. 7, shows the knotting of the bag complete as it appears on the cardboard. The knotting is removed from the cardboard by untying the drawstrings and drawing out the cardboard. The last cut to the right, Fig. 7, shows the ball of twine in the holder, the drawstrings pulled up and the loose ends at the bottom gathered together and tied in a tassle.

Every ball of twine has two ends, one to the outside and the other coming from the inside. When placing the ball in the holder care should be taken to allow the end coming from the inside to hang down with the strands of raffia forming the tassle.

Never use the outside end as it is quite impossible for the ball to revolve in a tightly fitting holder.

The twine holder when completed makes a most acceptable gift for the home.

Shopping Bag.

Fig. 8 shows a very interesting shopping bag. The bag part is made of any appropriate material and slipped into a covering of raffia made by using the Solomon's Knot.

The raffia part is knotted over a piece of cardboard 8 inches wide and 9 inches long. On the nine-inch edges and about one inch from the eight-inch edge cut notches and tie the strands of raffia around it

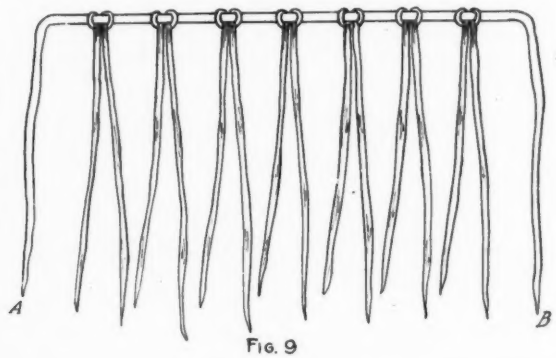


Fig. 9

as described in the twine holder. Over these strands of raffia knot twenty strands of raffia on each side of the cardboard as was described in the twine holder. Begin to knot at the top. Continue to knot until the desired amount of knotting is accomplished. The knotting is now removed from the cardboard and slipped over the bag as shown in Fig. 8.

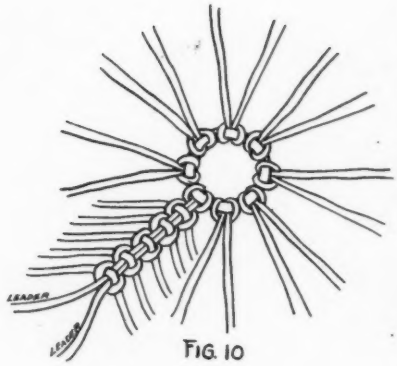


FIG. 10

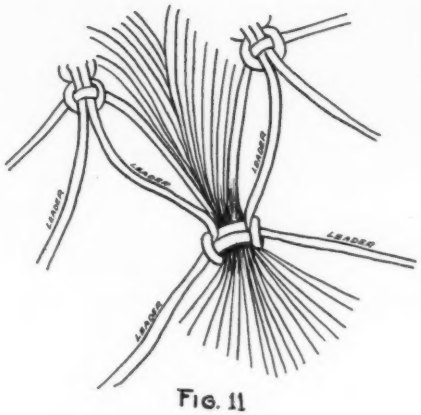


FIG. 11

The lower ends of the raffia are cut away and the cut ends are caught in the seam across the bottom of the bag.

The upper part of the raffia bag part is held in place by allowing the heading of the cloth bag to extend down far enough to stitch to the raffia. The bag suggestion is full of possibilities to the one who is interested.

Fancy Work Bag.

Select one good strand of raffia. To this one strand knot seven other strands as shown in Fig. 9. With the thumb and finger push these knots close together and with the loose ends A and B tie a hard knot. This draws the knots so they are arranged in a circle as shown in Fig. 10. The strands of raffia will be handled in pairs and the separate ends will be called leaders, Fig. 10. There are eight pairs in all as shown in Fig. 10. To each pair knot seven strands as shown in Fig. 10. This is done by placing a strand under the two leaders, at right angles with them. Proceed to tie, using the Solomon's Knot. Each knot must be pressed close to the center, thus forming a symmetrical center for the bottom of the work bag. To knot seven strands to each pair will require 56 strands. When all the knotting is completed, it will be found that between every two pairs there are fourteen strands, seven coming from the left and seven coming from the right. Gather the fourteen strands into one hand and tie together, using the first leader

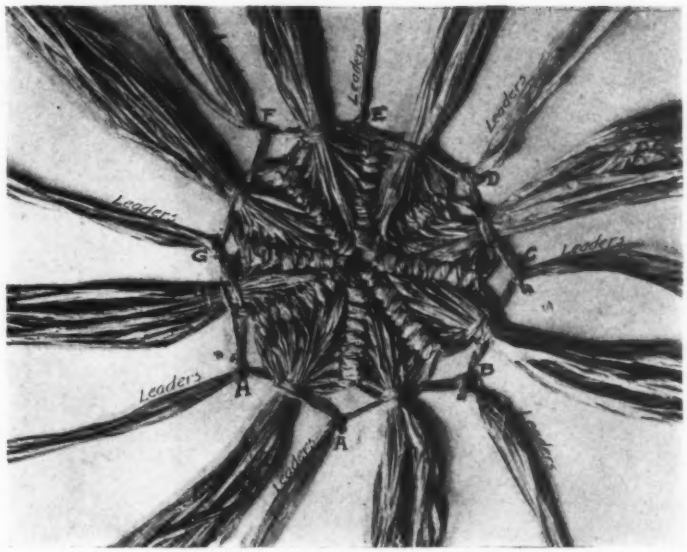


Fig. 12.

to the right and the first leader to the left for tying the knot, Fig. 11.

It must be remembered at this point that each pair means two leaders. Tie around in this manner and Fig. 12 shows the result. The next step is an

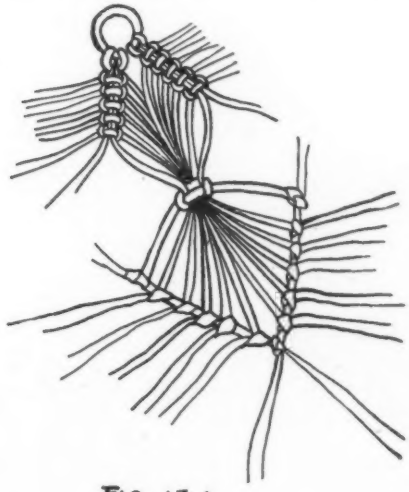


FIG. 13 A

important one, for upon it depends the shaping of the work bag. The two leaders, between two knots, naturally lie toward each other. They are tied together in an ordinary hard knot as shown at A, B, C, D, E, F, G, H, Fig. 12.

To make the bottom of the bag flat the leaders must not be pulled. This completes half of the central figure shown in the bottom of the finished bag, Fig. 13.

To complete the figure proceed in the following manner. Hold a leader, which points to the right, in the right hand. Take seven strands from the group of fourteen, and in their order, tie them in a hard

Fig. 14.

Fig. 13.

knot on to the leader held in the right hand, Fig. 13A. Take the other leader which points to the left and hold it in the left hand. The remaining seven strands of the group of fourteen are now tied in their order on to the leader held in the left hand. The two leaders come together at the point Fig. 13A. They are now tied close together in a hard knot, Fig. 13A. This completes one figure. Repeat until all groups have been knotted, Fig. 14.

A circle of No. 3 reed is now introduced and loosely tied to each point, Fig. 15. Each strand of raffia is carried under the circle of reed and knotted to it as shown in Fig. 13. From here, the Solomon's Knot is used in finishing the bag.

The ends around the top may be disposed of in

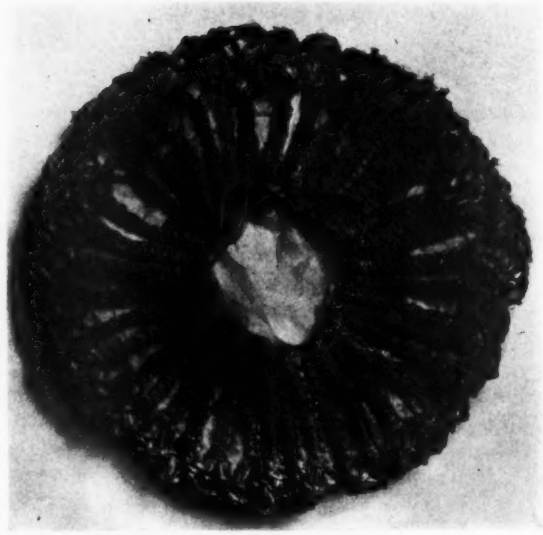
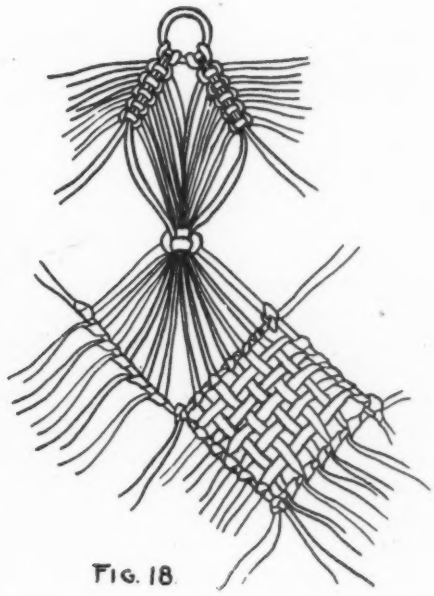


Fig. 16A.

Fig. 15.

Fig. 17.

Fig. 16.



several ways. Fig. 13B shows the ends caught under the heading of the bag. Fig. 16 shows the ends knotted in a low row of Solomon Knots. Loops are formed thru which the drawstring is run. Fig. 17 shows the bottom knotted over two circles of reed.

Fig. 18 shows one section of the bottom in which the ends, after being knotted to the leaders, may be interwoven so as to form squares, the remainder of the bag being finished as previously described.

Lining of Bag.

Each bag should be lined. This is done by cutting two circles of cardboard the size of the bottom. These circles are covered on one side with the lining material. The remaining bag part of the lining is gathered. This gathering is placed and sewed between the two covered circles of cardboard.

Hats.

Most interesting hats may be made by following the directions for the work bag. It will be necessary, however, to place the knotting over a wire frame.

Ten or twelve strands of raffia are knotted to the circle and five strands knotted to each pair. As the crown increases in size, two or three extra strands may be looped on the edge of a figure between the leaders. In this way the figures may be woven closely to the edge of the rim.

(Conclusion in May Issue.)

TEACHING SAFETY TO APPRENTICES

R. W. Tarbell and J. J. Metz, Apprentice Instructors,
Central Continuation School, Milwaukee, Wis.

WITHIN the last few years a great safety movement has spread over the country. Manufacturers have awakened to the dreadful toll of life and limb and have begun to take remedial measures. Chambers of Commerce have passed resolutions and endorsed the safety movement. The subject has been agitated with good results in legislative halls. The public is at last thoroly aroused to the awful waste of human life around us.

Statistics are always "bone dry," and will be scrupulously avoided in this article. Suffice it to say, however, that the casualties in our vast industrial army have reached appalling figures, while those of ordinary life, during man's "eight hours of play," are no less alarming. It has been estimated that the annual list of killed and injured equals that of an ordinary war. Mortality tables record a large number of accidental and preventable deaths.

During the last few decades manufacturing conditions have been getting more complex. The call for rapid production, with new machines, has resulted in many more injuries. It would almost appear that maimed and crippled workmen were a necessary by-product of a large plant, something to be accepted as an inevitable quantity; the human scrapheap would always remain.

Against this fatalistic view we are placing the present day propaganda, with "Safety First" as its slogan. Today we have in many states commissions to investigate industrial conditions, to set standards for shops to follow and in general to safeguard the workman. Unstinted praise must be given these organizations for the impartial way in which they are regulat-

ing factory life. They have prepared bulletins to cover almost every field of work and have been unceasing in their efforts to reduce danger to a minimum. One after another various agencies have added their mite to the promotion of the good cause, and now the schools are doing their bit.

It has been demonstrated a number of times, during this war, that the government could get good results for a movement by launching a campaign in the schools. In the great safety program, also, the public schools are asked to assist. When a job of this kind is put up to the teaching corps of a community, the details of the scheme are usually left to the school people. This is as it should be. Since the subject is comparatively new, there are doubtless many school people who are on the *qui vive* for suggestions.

The question most natural to the teacher's mind is, "What shall I teach, and how shall I teach it?" It is a simple matter to follow a prescribed course of study, taking each lesson in order until the text is finished. But here is a new proposition for the instructor. There is no book to follow, no precedent for a pattern and no definite means of knowing when the pupils have attained a passing mark in the subject. The question of suitable material for different classes and ages of pupils is by no means settled, neither has the proper method of presentation reached a desirable state of perfection. The instruction, then, consists of whatever lessons the individual teacher, or group of teachers, can assemble. During the past few years we have been gathering material for safety instruction in industrial schools, and we trust the results herein set forth may prove beneficial to others.

Our present work, teaching apprentices in Milwaukee, calls for a certain amount of instruction in safety. The material we submit and the methods employed will serve as a suggestion to other instructors in industrial schools.

A visit to one of our classrooms, taken during a safety lesson, might reveal something like this:

Teacher: "Has any one in the class witnessed a preventable accident recently?"

Several hands are raised.

Teacher: "William you may tell us about it please."

William: "Well, a fellow standing at his machine, lookin' around and got his fingers caught. He had two of 'em cut off. He's been off a month. It was his fault. He ought to mind his business better."

Teacher: "Was the machine guarded?"

W: "Yes, but he took the guard off."

T: "Do you think the guards on a machine are of any use?"

W: "Yes, but sometimes the men don't want them on."

T: "Where would you place the blame for this accident?"

W: "The man was to blame. He was too careless."

Having carried this point, the instructor can make the application that most of our industrial accidents are due to carelessness. By this time several others will have thought of some accidents and can relate them.

This informal discussion has accomplished several things. It has developed the power of expression in the pupil. It has helped him to analyze the conditions surrounding the accident and to lead up to a logical conclusion. It has been an exchange of views among the class members and a chance for the teacher to emphasize the essentials. In a very concrete way it serves as a warning to all to avoid the same kind of an accident in their own work. This last point is the pith of all safety instruction. Sometimes, instead of a discussion of this kind, the members are asked to write an account of some accident, or some devices to prevent it. This exercise in writing may also be used as an English lesson.

Another type of lesson consists largely of a story told by the instructor, from his own shop experience. A narrative, properly told, is always interesting, and this is the teacher's opportunity to impress on his class a knowledge of the danger around us all. A story of an explosion on a 4th of July, caused by improperly loading a toy cannon, resulting in the injury and disfigurement of several boys, is a good lesson to use at the close of school, a short time before Independence Day. Likewise, a lesson about slippery walks and icy steps is of value during the winter season, but not very essential during warm weather.

A very interesting and profitable bit of safety instruction can be given by means of lantern slides, which are always novel and interesting to a class. It may be a little difficult to procure suitable pictures of this nature, but they can often be borrowed from a central agency, such as the State Department of Education, or the Safety Commission. It is a simple matter to explain an accident from a slide and is a good idea for a beginning lesson. Often it is possible for the teacher to arrange with a man from the local shops to give a talk on the dangers to be avoided in industry, to show why some men are injured and others are not.

Let us see how the schoolman can obtain suitable material for lessons and how to put it into proper form for class use. At the present time practically every large plant or corporation has literature on the subject of safety. Of course this matter pertains to the particular plant in question and explains the danger spots in that industry, as well as rules for prevention. Usually this literature can be secured for the asking, and thus it is easy for the teacher to accumulate an abundance of material. It should not be supposed, however, that these pamphlets can be used as a text in class. The matter contained in them is of a special nature and can hardly be used intact in a class composed of boys from a variety of trades. A book of safety rules, as applying to work in steel mills, would hardly serve the purpose in a machine shop, and yet certain parts of it could be used. For instance, if a swinging crane is dangerous in one place, it will be in another; the same principle holds true. Or, take a book of safety rules prepared by one of our large railroad companies. The regulations set forth in it are applicable to a railway system, and deal with such things as switches, frogs, crossings, pits, signals, roundhouses, cars, etc., much of which would be of little interest to the boy working in some other place. However, the teacher can study these pamphlets and

prepare a very suitable lesson on the dangers about a railroad crossing, about flipping cars or crawling under a train to take a short cut home. It is thus seen that all available material on the subject will be of assistance.

After the instructor has provided himself with a supply of books and posters, and has visited the home industries to study conditions there, he should be able to supplement it all with his own experience and prepare a list of suitable lessons. This work should be outlined with an idea of the classes in the school. If a group of boys is entirely from the carpenter trade, it would be folly to give them rules and regulations for accident prevention in a machine shop. Carpenters should receive instruction on safety for their particular trade.

A point of classroom administration arises now, which appears to present obstacles. It is difficult to form classes so that all in a group will be from one trade. The machinists will be mixed up with the blacksmiths, foundrymen and others. This means that general classwork in safety must be suitable for all. The particular rules for each trade may be given out separately for those interested. A good plan to follow for the different trades is to prepare little sets of safety rules for each vocation. These rules may be issued as bulletins from time to time. Care should be taken, however, that the material issued in this way will pass muster when inspected by the men in the shop.

Since work of this kind is largely a matter of developing the safety habit, we have found it a good plan to have charts of accidents and dangers hanging on the wall. These may be pictures showing how a hand was lost thru carelessness, or how an eye was saved by wearing goggles. We make use of full-page safety displays which are printed periodically in the daily papers.

Below we submit an outline of safety work and wish to say a few words about it.

Common Dangers.

The Street. Crossing streets and tracks — turning to right —taking Dutchman's corner—slippery walks—manholes—defective sidewalks—falling icicles—throwing articles from windows.

Cars and Trains. Getting on and off—passing behind cars —trespassing—hopping cars.

Elevators. Proper conduct on one—crowding—open gates —looking into pit.

Stairways and Floors. Slippery stairs — weak handrails — broken boards—protruding nails on floor—lockjaw—obstructions on floor.

The Shop. Beginning on new machine—cleaning—oiling—repairing a moving machine—unguarded pulleys—gears—sprockets—set screws—air hoists—cranes.

The above outline gives ample material for five lessons on safety, all of which are classed as common dangers, and therefore suitable for all trades. With a little thought this list can be greatly enlarged.

Outlines, alone, do not suffice to make a good teacher. One must also have the ability to analyze the lesson and present the subject in a forceful, personal manner. Thus, in the lesson on street dangers, it would be a flat failure if the teacher merely mentioned the fact that it was dangerous to cross the street, without first looking both ways, or that falling icicles were a menace to the pedestrian. However, if the lesson is vitalized by a story of how a person was run over, while crossing the street in the middle of the block, or how a man was killed by a falling icicle while trespassing on a forbidden bit of sidewalk, the teacher holds the interest of the pupils better and can drive home the moral. Likewise, with the other four lessons listed above; the dry statement of facts is not enough.

Since part of the work in safety must lay stress on dangers around machinery it is well to consider for a moment how to plan the outlines. Belts and pulleys, gears and flywheels are guarded with a device to prevent accidents. Band saws and circular saws are covered so the workman will not be injured. The apprentice boy, who works around these machines, knows the purpose of these guards and is aware that it is against shop ruling to dispense with them. To simply tell him these facts will not inspire him in the least. It will soon tire him, because there is nothing in the discussion of lively interest to attract his attention and make him think. If the lesson is enlivened with a bit of personal experience, something on the story order, it will be a success.

If the school can do one thing well in this movement, due praise will be given. That one thing is to develop in the minds of young mechanics, as well as old, the knowledge that safety does not consist entirely in guarding a machine. It is not a matter of concern to the employer alone. It is a co-operative affair in which the employee must ever be on the alert. Many accidents are due to the ignorance and carelessness of employees and are in no wise the fault of the employer. For instance, we find the man who is always ready to take a chance, boasting of the fact that he is not afraid like others. He is either finally hurt, himself, or leads others to take unwarranted risks. Such a man is criminally negligent. Again, both young and old have the inveterate habit of throwing articles at one another, or playing other practical jokes. Staying out late the night before, or imbibing too freely, may also result in accidents.

As the pupil grows older in shop experience he should begin to see that keeping on the safe side is largely a matter of personal habits of alertness. He must develop within himself that consciousness of danger which will keep him wide awake to his surroundings.

In closing let us say that the subject of safety can easily be overdone. The lessons should be very brief, aiming to make only a point each time. Some lessons are very successful when only five minutes in length. It has seemed best, also, to leave this work until the last part of the class period. The lessons, requiring concentration, are finished by that time and the pupils are in a receptive state of mind for an exercise of this nature. A short topic, ably handled, on a subject of vital interest to the welfare of each, will make a good impression on every pupil.

WHAT SHALL WE TEACH?

Requests in great numbers are constantly coming to the Editors of the Industrial-Arts Magazine for advice concerning such matters of general interest as proper buildings for industrial arts work, equipments, courses of study, methods of class management and instruction, purchase of supplies, methods of rating pupils and teachers, problems of administration, and various other questions. Such requests have been and will continue to be complied with as fully as possible within the limitations of ordinary correspondence. But it is manifestly impossible to treat such important topics satisfactorily in this manner.

Hence, as announced in the March number, the Editors have decided that from time to time they will present in an informal, "semi-editorial" vein, their impressions concerning some of the more important topics that are pressed upon their attention by frequent requests.

THE question as to what should be taught under the name of industrial arts or manual training is persistently asked by all sorts of teachers, in all sizes and conditions of cities and towns as well as in rural communities. The easy way to meet such a query would be to dismiss the matter casually and to reply with an air of ambiguous finality that the body of information and experience demanded of a citizen in a democracy is and has been both definite and comparatively constant. It would likewise be easy to add the further very patent fact that while the needed information and experience remain moderately constant, the vital considerations for the educator are the places of emphasis and the kinds of emphasis to be employed. The curricula have changed but little in a generation—it's the predominating courses of study that have changed. It's the shift of interest and emphasis along the curriculum that demands constant alertness and attention. Curriculum and course of study are here used in their accepted sense, the former as the entire field of studies offered from which selections may be made, and the latter as the selections made to meet the needs of the individual or group.

When one examines the whole realm of human knowledge and experience and undertakes to pick from this great mass a curriculum for the school and then from the curriculum to select courses of study to meet definite demands, one faces as he never faced before the prime importance of having clearly defined purposes. And here is where the great weakness lies, and here is the secret of infinite trouble and confusion. School people are constantly making courses of study and buying equipments for types of work whose purposes they do not even vaguely understand and about whose character and value they frequently have no settled convictions. Both fear and ignorance are frequently cloaked under benign but non-committal terminology. "Culture," "initiative," "general education," "discipline," etc., have become the modern educational scarecrows set up in fields of tares to ward off investigation and criticism.

Now, what are the purposes of the manual, motor, and industrial activities in the public schools?

Purpose of Handwork in the Elementary School.

To be more specific, what are the purposes of the so-called handwork in the elementary school? Aside from the usual psychological considerations, the purpose of handwork in the elementary school is to give such an abundance of experiences with objects, materials, and fundamental activities as will give a broad basis for associative judgments and guides to conduct, and at the same time will leave a kind of residue or deposit of habitual reactions. The editors of this magazine are convinced that this purpose holds true thruout the elementary school, but that the methods and materials should be essentially different in the advanced grades from those used in the lower grades. In the upper grades, the work should involve certain elements of training and certain relations to the content and procedure of similar lines in the industries outside of the school.

The grade school, therefore, is and probably will and should always remain, an experience-giving institution. Its manual work will be characterized by variety of experiences and media, with no attempt whatever to specialize in any one. Hence the work will be prevocational, not in the specialized sense recently acquired, but in its etymological sense of preceding any attempt at vocational work. This aim will, of course, be modified to meet the needs of that group of individuals commonly found in our schools who cannot profit by the work formulated for the normal pupil. But the time is rapidly coming when such individuals will be instantly recognized, classified and put at special work adapted to their mental, physical, and economic needs. That is to say, the public school will remain an institution for normal children, and specialized departments will be organized to take care of the abnormalities.

Character of the Elementary School Work.

In the first four grades, and perhaps in the fifth, the work of the boys should not be differentiated from that of the girls. Likewise, the art work should not be separate and distinct from the constructive work. They should be handled together, preferably by the same teacher and preferably also by the regular classroom teacher instead of a specialist. The art and construction work of these first five grades should be so interwoven with the geography, language, numbers, nature study, etc., that they would cease to stand out as things apart from the regular school subjects. They should form a kind of cement that would hold all the others together and give them coherency, form, and permanency.

Drawing, freehand paper cutting, booklet making, weaving, clay modeling, and sand-table work are

indispensable to the first five grades. Coping saw work with thin wood or beaver board, possibly a very limited amount of basketry, and some constructive work with wood in connection with doll houses and furnishing, may be profitably undertaken under proper conditions.

For the work of the sixth grade, the boys and girls will be separated. There are three kinds of work excellently adapted to the needs of sixth-grade boys, namely, a certain sort of woodwork, bookbinding and printing. The ordinary type of woodworking where accuracy of measurement and tool manipulation are insisted upon, has no place in the sixth grade. If some useful and interesting problems could be devised in the rough sort of woodworking that requires mainly such tools as the steel square, saw and hammer, with no necessity for great accuracy of construction or beauty of finish, they would make wonderful sixth-grade work. The type of woodwork here suggested is such as would appeal to a farming community in the making of chicken coops, fruit and vegetable crates, etc. But the difficulty is to find problems of this nature that would fill a need in city or town life. The other form of woodwork that is adapted to the sixth grade is the making of mechanical toys and devices. This kind of work has been most successfully used in a number of school systems.

In the seventh and eighth grades, there is a crying need for a greater variety of work and of materials. Reliance has been placed too exclusively and too confidently upon woodworking. The kind of woodwork so generally given has been so artificial and stereotyped that the life has been crushed out of the subject. Metal and various other materials should be combined with the wood in making mechanical devices, toys, and other articles. Simple pattern-making, with the necessary lessons in molding to give some knowledge of the whole process, has a most valuable place in the seventh and eighth grades. Repair work of furniture and buildings may be used with profit, if used with discrimination. A printshop seems almost indispensable to the work of seventh and eighth-grade boys. The field of electricity with its multiplicity of devices, conveniences, etc., that would make ideal problems for these grades, is just now being opened up. Electricity has as great possibilities for manual work as any other line. Both freehand and mechanical drawing should accompany the construction work of the grammar grades.

Of course the time element is a very important item, and the brief time now given to manual work in the elementary school is entirely inadequate. The way to get the time allowance increased, however, is not to sit down and go to seed on one little line of stereotyped "models" and endlessly discuss "technique" and "tool processes," while the boys lose interest and the work suffers. The better way is to fill the time so completely full of real, vital, interesting work of great variety as to demonstrate conclusively the need for more time.

What Shall the High School Teach?

When the high school is reached, all is changed. The boy has gone thru the preliminary, experience-giving period and is now ready for the real job. Presumably, he is approaching manhood's estate and is putting away childish things. He is no longer willing to take things on faith. Indeed, the good high school no longer asks him to do so. Such a school might appropriately be called the "Why School."

It should be pre-eminently the place where the reasons for things are sought, where investigations are made, and explanations are proposed and tested. The high school should be, and the good high school is, the place where science in all realms blossoms forth and where the scientific method and attitude are insisted upon.

The junior high school, therefore, or some arrangement whereby its functions can be performed, rests on a fundamental notion and is, or deserves to be, a permanent institution. The corollary of this is, of course, that the specialized senior high school, or some organization that will assume its functions, with its perfectly frank, definite, intensive curricula leading to perfectly definite ends, likewise deserves to supplant the general or classical high school. With the general establishment of the junior and the specialized senior high schools, the problem of organizing technical courses would be very much simplified. Once these schools were established the purposes of the instruction in them would become definite and understandable. To get a sane, consistent, rational statement of the purposes of high school instruction would be a noteworthy achievement in itself.

In the junior high school, the technical courses would be admittedly provocational—a-looking-forward to definite vocation—a-tryout-school where definite units of various lines are performed as a test of the wisdom or unwisdom of selections made—a guidance and selective process. The technical courses in the specialized senior high school would be frankly vocational as far as they went. There would cease to be any dilettante playing with make-believe "vocational courses" for "culture" or "discipline," or what not, but there would be a vigorous prosecution of the trades themselves for the time allowed to technical work.

Whatever the type of the high school organization, the so-called manual training, as it exists in most high schools, must undergo a radical change. First of all, it must state its purposes and proceedings in terms of their relation to the future efficiency of the individual either in the world of industry outside the school or in the prosecution of other technical courses of more advanced grade.

If such purposes as these be accepted and such standards set up some of the work that has heretofore occupied prominent places in the schools will

either be eliminated or very materially reduced in importance. The ordinary high school forging is an example of such a line. As a distinctively vocational line of work, as a training necessary to such other courses as agriculture. On this basis, woodturning would cease to demand special time, courses and equipments, but would simply be an incidental part of certain cabinet making and pattern making courses. Cabinet making itself of the kind usually given in high schools would cease to occupy the prominence now given to it. In fact the cabinet making trade is so highly specialized that the cabinet making done in most high schools bears almost no resemblance to the industry itself.

On the basis of the foregoing statements, the modern high school, whatever its organization, will have a shop equipped with woodworking machinery, benches, and lathes for cabinet making and pattern-making. In large schools, it will probably be necessary to have separate shops. There will, of course, be a machine shop. A small forge shop equipped with modern welding apparatus will be necessary. A large shop equipped for all kinds of electrical instruction will be essential. Such a school will have a shop for automobile and gas engine instruction. Modern carpentry will be a prominent course and there should be a special shop for this purpose. No modern high school would be complete without a printing establishment with sufficient equipment to give the fundamentals of the various phases of printing and journalism. A foundry and moulding room will be necessary for that trade and for use in connection with the pattern-making courses.

The lines of work here indicated together with the necessary drafting rooms the Editors conceive to be the essential shops and equipments for a good modern high school. However, there are other trades that are included in the instruction of many schools and may be regarded as legitimate candidates for places in the high school. These are cement work, jewelry and watch repairing, shoemaking, brick laying, baking, tinsmithing and sheetmetal, plumbing, and possibly a few others.

The attempt here has been to sketch in outline some fundamentals governing the organization of the industrial arts work. Whatever specifications and details have been used have been for purposes of illustration, because in this limited space, it would be clearly impossible to particularize in too great detail.

Projects for the School Bazaar—The "Dowel" Doll

Bonnie E. Snow and Hugo B. Froehlich

Article 7.

"She follows me about my house of life,
This happy little ghost of my dead youth.
She has no part in time's relentless strife,
She keeps her old simplicity and truth,
And laughs at grim mortality,—
This deathless child that stays with me,
This happy little ghost of my lost youth.

My house of life is weather-stained with years;
Oh, child in me, I wonder why you stay?
Its windows are bedimmed with rain of tears;
Its walls have lost their rose; its thatch is gray.
One after one its guests depart,
Too dull a host is my old heart!
Oh, child in me, I wonder why *you* stay?

Oh, child in me, leave not my house of clay
Until we pass together thru its doors;
When lights are out, and life has gone away
And we depart, to come again no more.
We comrades who have traveled far
Will hail the twilight and the star
And gladly pass together thru the door."

The spirit of these beautiful verses (by May Riley Smith) was never more happily manifested than by a class of "Summer School" students, ranging in age from the maiden of bashful 15 to the matron of 40 and upwards, all completely absorbed in learning to manipulate the commonest of household tools,—a saw, a hammer, a file, a plane, for the key to the anatomical mysteries of the Dowel Doll lies in ability to perform successfully a few of the simplest of tool operations.

"What is a dowel?" "How shall I hold the saw?" "Is this a file?" "Is a brad the same as a tack?" These were some of the questions put to the instructor before his presentation of the problem, indicating all too clearly certain depths of feminine ignorance. But the fascinating model held up to view by an instructor who was at least as much of a "child" as any in his class, was irresistible in its appeal. Upon being assured that the construction of the Dowel Doll was within the capabilities of a sixth-grade class of girls and boys, each one of the hundred student-teachers set her teeth firmly and with grim determination she tackled the job, muttering to herself as she seized the first implement, a ruler, "If a 12-year-old girl or boy can do this, I guess *I* can!"

A dowel is a round wooden rod or stick made especially for cutting up into dowel pins for the construction of joints, the uses of which need not be here described. Dowels are commercially supplied in sizes ranging from one-eighth of an inch to two inches in diameter. In the present problem, the body, head and neck of the doll are made from a single piece of one and one-fourth inch dowel; the legs are sections of a three-fourths inch dowel, and the arms of half-inch dowels. A curtain pole that has outlived its usefulness may be sawed into lengths for the body, in schools where manual training supplies are not available. Small dowels for the legs and arms can usually be obtained at hardware stores, and such tools as are necessary may be brought from home, if it is not possible to purchase for the school the simple equipment that is required.

Before beginning work there should be on hand, in addition to the dowels in three sizes, six half-round

files, six round or rat-tail files, one back-saw, a small plane, three hammers and a pound of one inch, flat-head brads. These tools will sufficiently equip a class of forty pupils. A bench vise is almost a necessity for holding the dowels firmly in place during the operation of sawing.

Fig. 1 shows the Dowel Doll complete, dressed in a simple costume of white barred muslin, with decorations of stitchery. The shoes are cut from cardboard or thin wood (cigar boxes are excellent for this), painted black, and glued or nailed to the ends of the legs. The stockings, face and head have been appropriately painted. The parasol is woven from mercerized embroidery cotton. On her wrist the doll carries a paper knitting bag, which bears the symbol of the Red Cross. She can stand on her own feet, she can assume and sustain a sitting position, she can extend one or both arms and she can put one foot before the other. She cannot turn her head, nor open and shut her eyes, but she has many points of advantage over other dolls that have been "made in Germany" or France. She is practically indestructible, and if she should be so unfortunate as to lose an arm or a leg, the member could easily be replaced. Best of all, she is "Made in America," and by an American boy or girl.

Fig. 2 gives the dimensions of the dowel for the body. Fig. 3 shows the measurements of the dowels for the legs, and Fig. 4 those for the arms. Figs. 5 and 6 show the kind of files that are used. The first tool operation is illustrated in Fig. 7,—the filing of a groove for the neck, one and one-fourth inches from the end of the large dowel. The neck may be as beautifully modeled as the skill of the worker will permit. There is no hard and fast rule about width or depth of this groove. Figs. 8 and 9 show the process of sawing half of the three-fourths inch dowel to the depth of one inch, in order to form a joint that can be nailed to the body. In Fig. 10 the half-round file is shown in position for shaping the top of the head. Here again the worker may do his utmost in modeling a head of a highly intellectual type, or he may content himself with a mere "flathead." The cap or bonnet worn by the doll will cover all deficiencies. Fig. 11 shows two tool operations. One end of the half-inch dowel has been planed to form the shoulder joint, and the other end has been modeled with the rat-tail file to form a hand or wrist.

Fig. 12 shows the parts of the body assembled,— arms and legs nailed in place with brads, so that they articulate freely yet are still firmly joined. Figs. 13 and 14 show the shaping of the shoes and the method of attachment to the leg.

Fig. 1

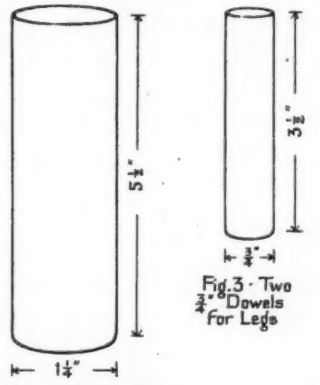


Fig. 2 · Curtain Pole For Body of Doll ·

Fig. 3 · Two ¾" Dowels For Legs

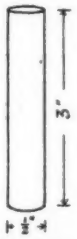


Fig. 4 · Two ½" Dowels For Arms

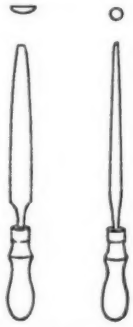


Fig. 5 · Half Round File

Fig. 6 · Rat-tail or Round File

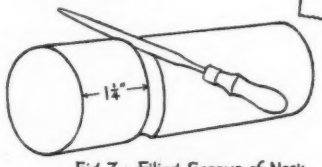


Fig. 7 · Filing Groove of Neck with Rat-tail File

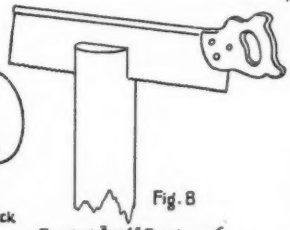


Fig. 8
Sawing ⅜ x 1" Section of Dowel to Form Leg Joint

Fig. 9 · Leg Joint Complete

Fig. 10 · Shaping the Head with Half-round File

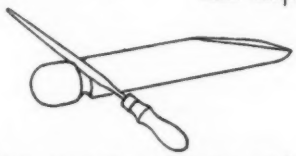


Fig. 11 · Hand Shaped with Rat-tail File Upper Arm Planed with Block Plane or Filed with Half-round File · ·

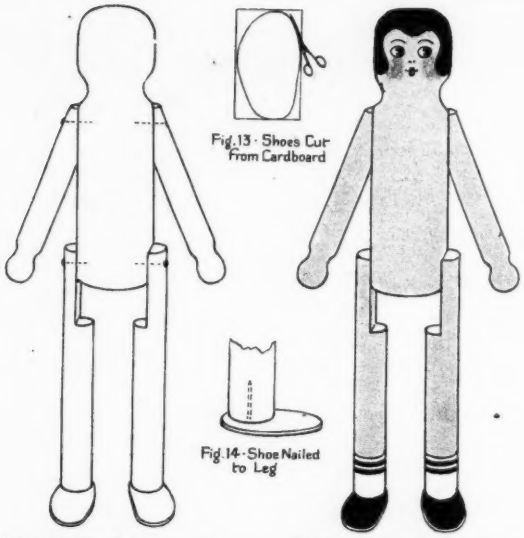


Fig. 12 · The Dowel Doll Assembled and Given a Coat of White Paint

Fig. 13 · Shoes Cut From Cardboard

Fig. 14 · Shoe Nailed to Leg

Fig. 15 · A Second Coat of Flesh Color Enamel Applied with Accessories such as Hair, Features, Stockings and Shoes

When all the parts are nailed together the whole doll is given a coat of white paint. When this is dry, a coat of flesh-colored enamel is applied, with such accessories as hair, features, stockings and shoes rendered in appropriate colors, as shown in Fig. 15.

Dressing the dolls is a delight to all girls. With older students great freedom may be permitted in the choice of garments and costumes. With younger children patterns for bloomers and a simple slip should be dictated, and drawn on paper first. Fig. 16 gives dimensions and plan for pattern of bloomers, and Fig. 17 shows the method of rounding the corners of the paper pattern. Fig. 18 shows the bloomers cut from muslin or other suitable cloth, with the openings for the legs buttonholed, and the hem run in for the drawstring. Fig. 19 shows the garment drawn into shape.

The pattern for the doll's dress or slip is very simple. Fig. 20 shows how it can be cut from a piece of eight-inch by fourteen-inch paper. When the dress is cut from cloth, the edges are hemmed and a decorative stitch such as a long running stitch, a blanket stitch or a cross stitch is used for trimming.

Figs. 21, 22 and 23 give the pattern and the processes of cutting, making and finishing a hood or bonnet, which is usually made from the same material as the dress and is decorated or trimmed with stitchery in some bright color.

The making of the doll's parasol is a problem well adapted to the primary grades. A section of a cork three-fourths inches in diameter is used as a center. Into this are inserted eight round toothpicks at equal distances from each other. The toothpicks form the ribs upon which is woven mercerized cotton "woof," in colors that harmonize with the decorative stitching on the dress and bonnet. Figs. 24 and 25 show the construction of the frame and the process of weaving. Fig. 26 shows the insertion of a short hatpin or a "flower-pin" into the center of the under side of the cork. The ends of the toothpicks, the cork center and the hatpin may be painted black with opaque water colors and shellaced, if desired.

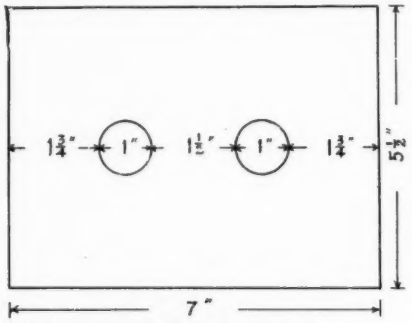


Fig. 16 · Pattern for Bloomers with Holes Marked For Legs

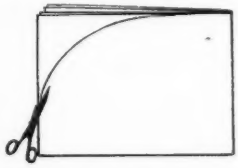


Fig. 17 · Pattern for Bloomers Folded on Two Diameters and Corners Rounded

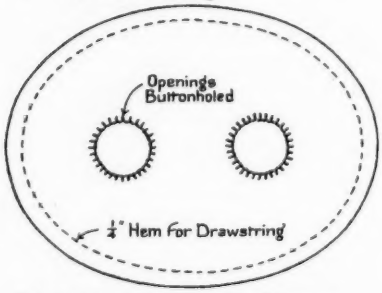


Fig. 18 · Muslin or Percale for Bloomers Cut From Paper Pattern

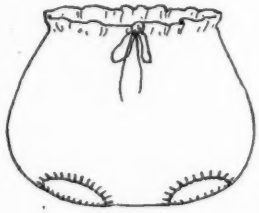


Fig. 19 · Bloomers Drawn into Shape

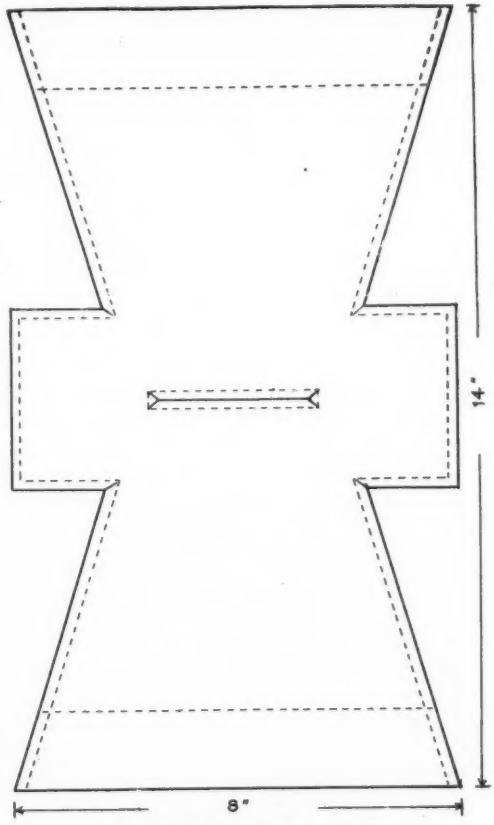


Fig. 20. Pattern for Doll's Dress.

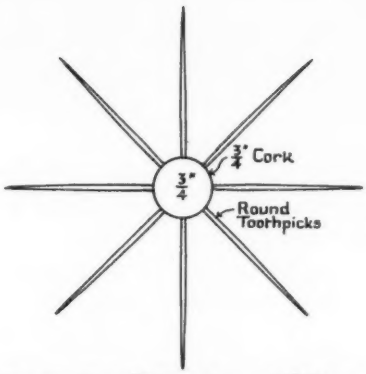


Fig. 24 · Cork ¾" Diameter and ½" Thick with Eight Round Toothpicks Set in for Ribs

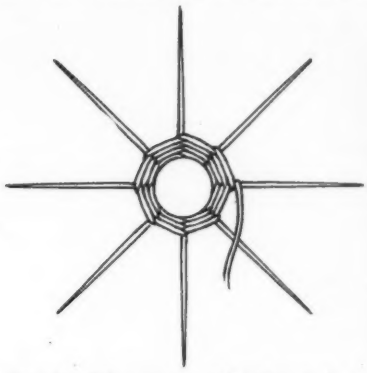


Fig. 25 · Silkateen Used for Weaving

Fig. 26 · Orange and White Silkateen Used for Color Scheme Flower Pin Used for Handle

Fig. 27.

A supervisor who has successfully presented this problem to her grades writes as follows:

"We are making the Dowel Dolls in two seventh grades. The dresses are being made in the eighth grade, and the faces, hair and stockings are painted in high school classes. The little umbrellas are being made in the fifth grades. With a careful teacher these might be made in lower grades, but we have so many inexperienced teachers in our lower grades this year that it seemed inadvisable to put them there."

In another town the dolls were made by boys in the sixth-grade shops. The entire output, numbering several hundred dolls, was turned over to one of the high schools to be dressed. As the dolls were to be sold at a bazaar in which all the schools were greatly interested, the teachers and the high school girls went to work with a will. Family "piece-boxes" were raided in a hundred homes, and a bewildering mass of material for costumes was thus secured. The planning and making of the costumes was not confined to the art department. Staid and dignified teachers of English, history and mathematics, acting under the influence of the "Deathless Child," grew enthusiastic over the project and took home dolls to dress. In addition, they supplied ideas and materials for their students. A single selection from the marvelous results is shown in Fig. 27.

The costumes represented many characters in literature and history, and the dolls sold for one dollar each at the school bazaar.

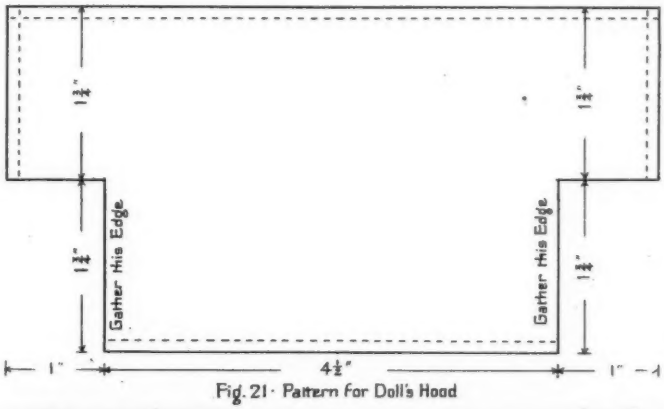


Fig. 21 · Pattern for Doll's Hood

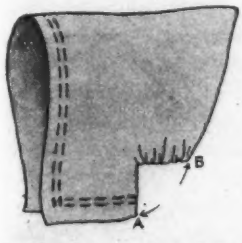


Fig. 22 · Bonnet with Hem, Stitchery Gathering in Place – Sew Edge A to Edge B

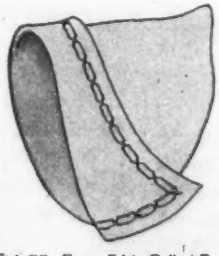


Fig. 23 · Front Edge Rolled Back

The next article will take up the designs for a sewing cabinet.—*Ed.*

INDUSTRIAL-ARTS MAGAZINE

Board of Editors

E. J. LAKE S. J. VAUGHN

W. H. HENDERSON

EDITORIAL

THE WAR'S INFLUENCE ON THE SOLDIER-TEACHER.

A GOOD many people have been fearful lest there might come back from the army some unwholesome, or at least, unpleasant customs that would have in them menacing elements.

While there is always this danger in a crisis when conventionalities are suspended, yet we have the feeling that the good-fellowship, the common hardship, and the exchange of points of view have fostered habits, established new customs, and destroyed fictions so that the influence of those experiences will be decidedly good.

The teachers who have done their duties in the army will never be the same teachers they were before the war. We expect that they will be very much better teachers. They have come into relation with all sorts and conditions of men from all fields of work, with all varieties and shades of opinions. This fact cannot fail to broaden and strengthen the man from the schoolroom.

It has been a common charge against teachers that they were narrow, opinionated and clannish. People have said that school teachers always "talk shop." Perhaps they do—perhaps other groups and professions do the same. Some have even said that school teachers can be "recognized a block away." Be that as it may, we have often advised teachers to cultivate a wide acquaintance among people of greatly varying occupations. This is undoubtedly one of the most important things one can do to promote his own growth and usefulness, and at the same time, to fit himself more perfectly to deal with the children of people from the various occupations.

The life of the army has forced this very thing upon the soldier-teacher. He has shared the common lot of the soldiers. He has learned the ways of others and has their points of view. In khaki, at least, it is doubtful whether the teacher could be "recognized a block away."

We expect the returned soldier-teacher to be broad-minded, to have greater respect for stern realities and less respect for shams and hypocricies, to be more sympathetic with boys who work under orders and less sympathetic with foolish orders and senseless routine, and to have a heightened sense of the value of life and the importance of time in the making of it.

If he comes back with these added to the excellent qualities he took away with him into the army, a revolution may be expected in the school teaching business.

ART A NECESSITY.

IN this time of inspection and introspection of educational methods, it is well to remind ourselves of a distinction between sins of omission and commission. The drastic sweeping aside of instruction in subjects that do not seem to have reached the fulfillment of their purpose may be fatal to certain educational interests of which these courses are a small but necessary part. Art instruction has been carried on in some of our common schools in a restricted and pitiful manner. No one who has visited our rural schools and observed the painful redrawing of cartoons and magazine illustrations by a few misguided children, under a misguided and unprepared teacher, can for a moment doubt that such work is almost worthless. Many trained teachers of art would pronounce it worse than worthless. Yet we believe that even this feeble effort is the expression of a demand on the part of humanity for something which it will not be denied. Strangely enough some of our most successful artists have come from these rural schools and the vital spark of ambition has been created and kept alive by the opportunity to copy some cartoon that was none too good in the original. The demand which is now occasionally heard that art instruction be left to the several teachers of subjects to which art finds application is not less utopian than the socialistic demands which could be successful on the assumption of universal and individual integrity and efficiency.

Art instruction must be cared for in our schools by well trained teachers of art until such a time when art is recognized by all of our school teachers as one of the vital factors of civilization. Our immediate problem is the training of these teachers and the development of the innate demand for art in the life of our people.

IMPORTANCE OF ACADEMIC WORK.

THE shattered and palsied "mailed fist" of Prussianism is another monument to the fact that any system that ignores spiritual values and relies upon physical force is doomed from the start to ultimate and inglorious defeat. With tremendous sacrifice, almost every generation has had to demonstrate this fact anew.

Perhaps it is not necessary to remind teachers of the industrial arts that mere material mastery may be far from genuine achievement and success—that people "cannot live by bread alone."

In their perfectly laudable anxiety to promote vocational efficiency, vocational advocates have sometimes seemed to sneer at academic scholarship and to scorn poetry, history, fine art, languages and literature, and such subjects as are commonly classified as

cultural. Their quarrel has undoubtedly been with the *kind of material and the character of the instruction* that have been used in such subjects.

Now is a good time for all of us to be sane, judicious and tolerant. Everyone should recognize that *ideas rule the world.* Education deals with *ideas.* Industrial education undertakes to put ideas into concrete form and to give them vital and effective expression in the realm of industry.

It has frequently been said that no education is satisfactory or adequate that does not prepare one for his daily occupation. This is true. It is just as true that an education that simply enables one to do the daily task for pay is both inadequate and dangerous. There are sixteen hours of the day to live after the daily-wage-earning task is done. Any type of education that neglects these and the important duties that lie outside of the wage-earning task is defective and short-sighted indeed.

The ideals of a democracy will never be met until the world's workers have a liberal fund of the thoughts and visions and aspirations that are common currency among those who are striving intelligently and unselfishly to live on the highest plane of life and to better the conditions of mankind.

The knowledge of the world finally gets into books. Life gets into history. The spirits of men get into language and literature. The deepest emotions and the highest aspirations of the soul get into art, music, and poetry. Thru these channels much of the best in every civilization is inherited by those who follow.

It is, therefore, vastly important that rich and abundant academic courses be offered in the schools. It is imperative, however, that such course be modernized and vitalized and made to glow with reality and purpose and that they be taught by forceful, virile people who know life and are able to interpret it to others.

WEAK IN THE MIDDLE.

OUR school system has been pronounced "weak in the middle" by a recent critic. The closest attention of our pedagogical experts has been given to juvenile instruction with the result that the first six or seven grades of our common schools have been the "best taught." Our colleges and universities have flourished by the attention to professional instruction supported by generous public appropriations and private donations. "Our boys and girls from fourteen to eighteen years have been neglected."

Neglect of boys and girls at this impressionable age has not been a matter of withholding opportunity to go to school because the schools did not exist. High schools have increased proportionally in attendance and equipment over any other division of our school system. How then is our school system "weak in the middle?"

This post war time is productive of physical analogy. Our educational feet have been kept in fair marching order. Our educational head has been active and has produced enormous scientific advantage to the nation and no mean professional advance. Our educational digestive apparatus is weak. "Weakness in the middle" implies poor digestion. A weak stomach results from either not enough nourishing food or too much indigestible stuff without general activity of all the physical functions. But we need not carry this homely analogy further; let us bring the prodigal back to a good, nutritious bill of fare.

CONVENTIONS WITH A PURPOSE.

EDUCATIONAL conventions frequently lack a definite purpose that corresponds in importance with the time and money spent by teachers and supervisors in attendance. The great majority of state and sectional associations afford an opportunity for visiting a large city and if the time devoted to meetings is measured and compared with the hours used for shopping, sight-seeing, eating and attending theaters, the professional spirit and the probable educational returns appear small indeed. It has not been evident to us that the teachers are so much to blame as the program makers and speakers who have failed to put into the program, material of compelling interest and of immediately applicable value.

Conventions in the field of vocational education and industrial arts instruction have been remarkably free from the objections to school meetings cited above. The National Society has ever had in mind the "promotional" idea expressed in its original title and its effectiveness in advancing the cause for which it stands is unique among school organizations. The "Eastern" and "Western" associations have not always been successful in keeping their true purpose before them so that each convention might work a step forward. But they have been head-and-shoulders above the average education association. This year especially they have for themselves set a task which is of immediate necessity and of compelling interest. They propose to discuss educational reconstruction and to show what part the manual arts and the drawing teacher must take in making over the schools for the new era of peace. Both associations deserve the hearty support of their sections.

"I do not want art for a few," said William Morris, "any more than education for a few, or freedom for a few"—and civic arts is essentially public art. It has been likened to "a fire built upon the market place, where every one may light his torch; while private art is a fire built upon a hearthstone which will blaze and die out with the rise and fall of fortunes."

"Beauty in art is truth bathed in the impression, the emotion that is received from nature. Seek truth and exactitude, but with the envelope of sentiment which you felt at first. If you have been sincere in your emotion you will be able to pass it on to others."
—*Corot.*

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

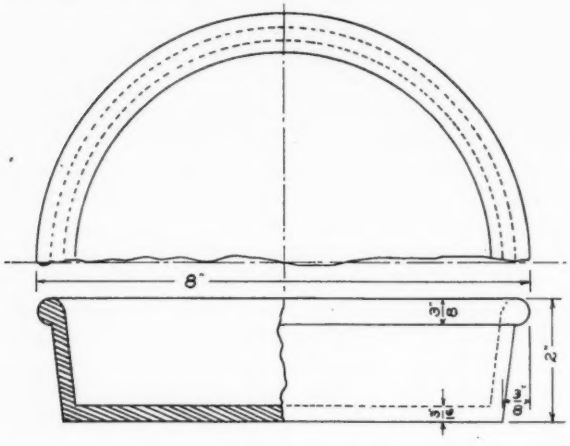
Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

FOUNDRY SAND AND TOOL PAN.

R. H. Chandler, Oak Park, Ill.

It is always hard in pattern-making to find useful projects that are interesting to the boy, and which will bring out necessary methods of pattern construction and principles of molding.

This problem in pattern-making was designed with that thought in mind. The boy makes the pattern in his pattern-making course, forms a mold of it in the foundry, and uses the casting of the pan during his foundry work for holding parting sand, small molding tools, etc.



Foundry Sand Pan. $\frac{3}{4}$ Scale

The construction of the pattern is interesting. A wooden face plate is turned smooth and true on the lathe with one-fourth inch oversize allowance on the diameter. Six segments are next fitted even with the outside edge. Each segment is jointed consecutively and clamped securely as soon as it is fitted. When the row is all on and clamped they are glued by removing one at a time and applying the glue to both the segment and the section it rests on. Then the segment is rubbed in place and clamped, and the next one is glued in the same manner. If the segments are of equal thickness no truing of the surface is necessary between the built up rows, the next row being placed as soon as the glue sets. Some boys will glue the three rows in an eighty-minute period.

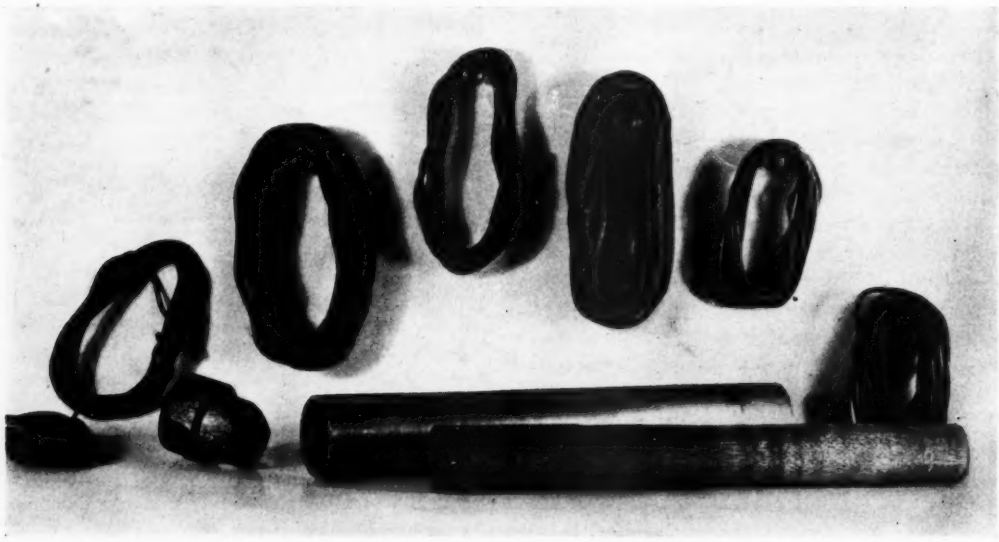
THE COMPLETED PAN.

Part of the wooden face plate is used for the lower section of the pattern. Criticism might be made of the one-piece bottom warping, but the writer has found this method practical in general shop practice on small patterns, from which few castings are needed.

WAX FILLET GUN.

R. H. Chandler, Oak Park, Ill.

In the school and commercial pattern shops where wax fillets are used on pattern, some means must be employed to



A "GUN" AND THE FILLETS MADE WITH IT.

convert the lump beeswax into rolls or strings of various sizes. The fillet in this shape results in greater economy of time, for it can be strung along the corner and quickly pressed into place with a warm fillet iron.

The fillet "gun" in the illustration can be made in a short time. A piece of brass or iron tubing about nine inches long and one and one-eighth inches inside diameter is used for the principal part. Four holes varying in size from one-sixteenth to five thirty-seconds are drilled around the tube one-half inch from one end. These holes are for the various size fillets.

Next a short plug of hardwood is turned to fit tightly into the tube. The end of the plug is grooved or beveled in such a manner that only one hole is exposed at a time so that by giving it a quarter turn in the barrel any of the four sizes of fillet can be made. The ramrod of the gun must be turned to a very close fit and must be strong enough to withstand considerable pressure.

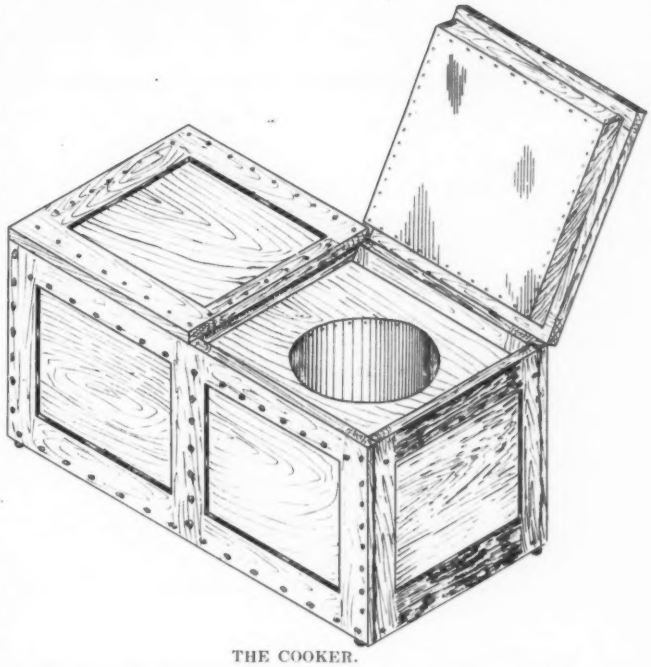
To make the fillet, small lumps of wax are dropped into the barrel until it is nearly full. The ramrod is started in and the gun warmed slightly. Then the gun is placed in a vise, press, or carriage clamp and the ramrod is forced in. As the fillet string comes out the side, the operator winds it up into loops around his hand.

HOW TO CONSTRUCT A FIRELESS COOKER.

Ralph F. Windoes, Davenport High School.

As a cabinet making project for secondary schools, the fireless cooker is extremely practical in its use, and requires more than the ordinary skill in its making. It functions when the heat it retains is above the cooking point—160°, hence it must be carefully constructed so as to prevent radiation. Its value to the housewife is two-fold—it saves nearly 75 per cent where gas is used to cook with, and prepares some foods —notably soups and cereals—in a more savory manner than they can be prepared by the ordinary methods.

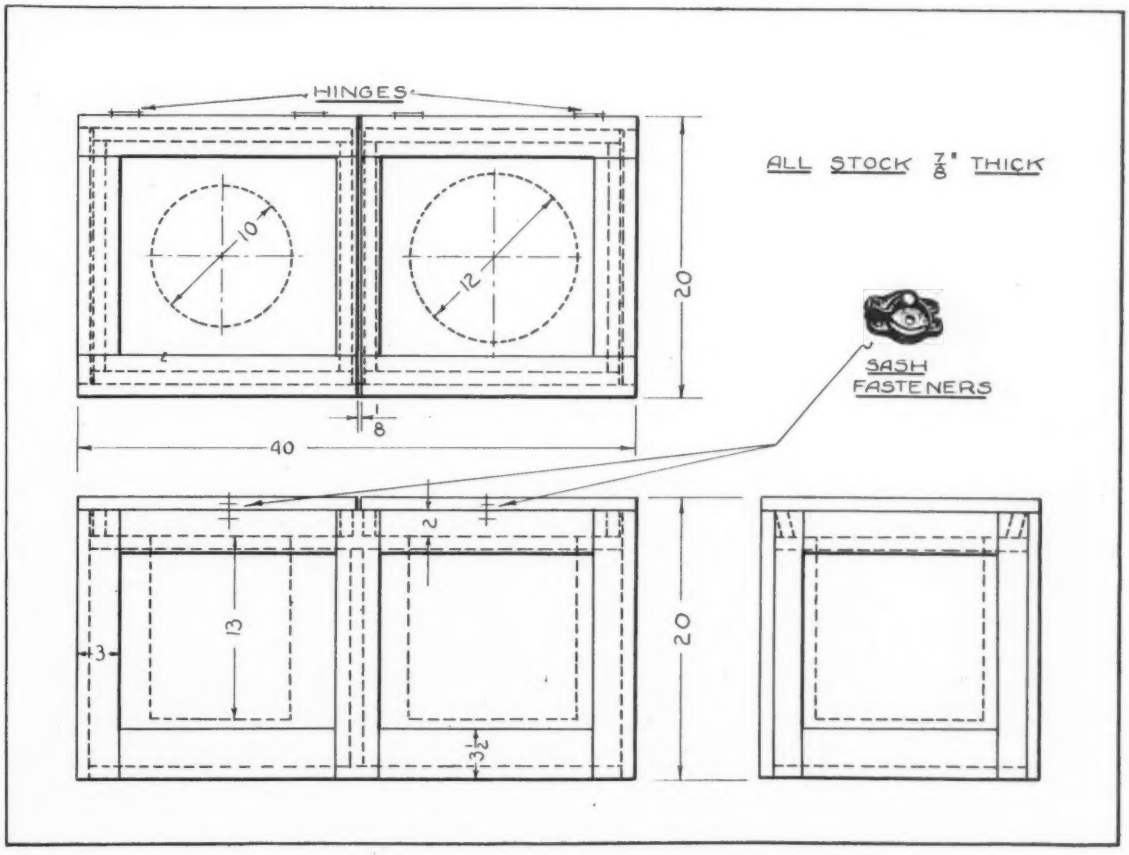
Figure 1 is an isometric of the finished cooker herein described, with one cover raised. It will be noted that, in addition to the usual cabinet construction for work of this



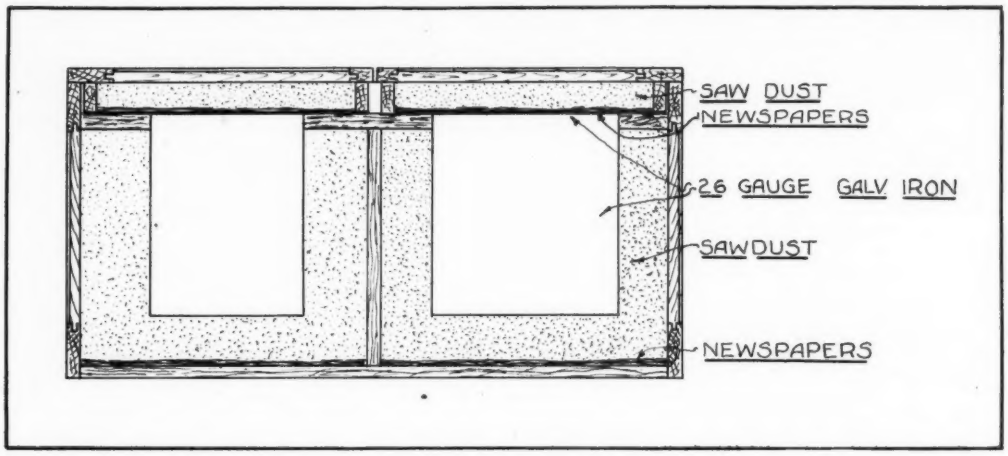
THE COOKER.

kind, the sections are securely screwed together with round head blued screws. These may not add to its appearance, but they help to retain the necessary heat, and, since this is a more practical project than a decorative one, they should not be objectionable.

Figure 2 gives the working drawing. The four sides are



DETAILS OF FIRELESS COOKER.



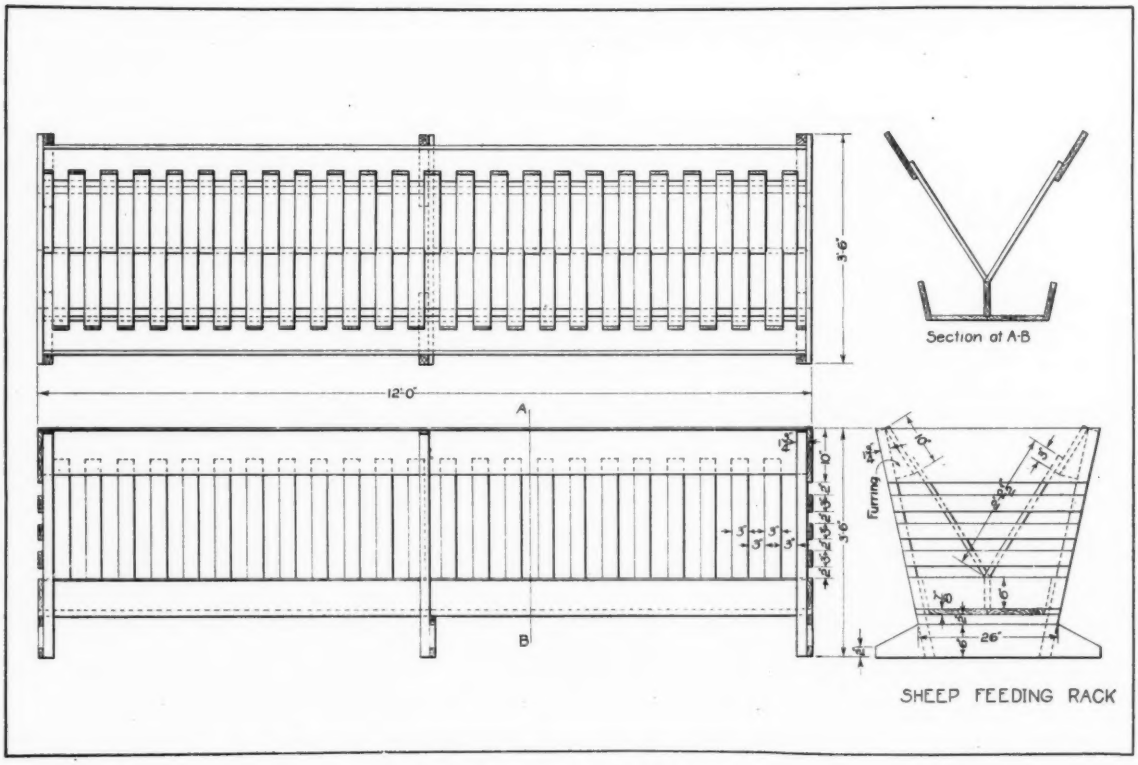
DETAILS OF FIRELESS COOKER.

panelled, the stiles running from top to bottom, while the rails are mortised into them. The rails and stiles are of $\frac{7}{8}$" stock, and the panels of $\frac{3}{4}$". The section, Fig. 3, shows the panels to be flush with the rails and stiles on the inside surfaces. The vertical partition thru the center is $\frac{7}{8}$" thick, as wide as the end panels, but $3\frac{3}{4}$" shorter.

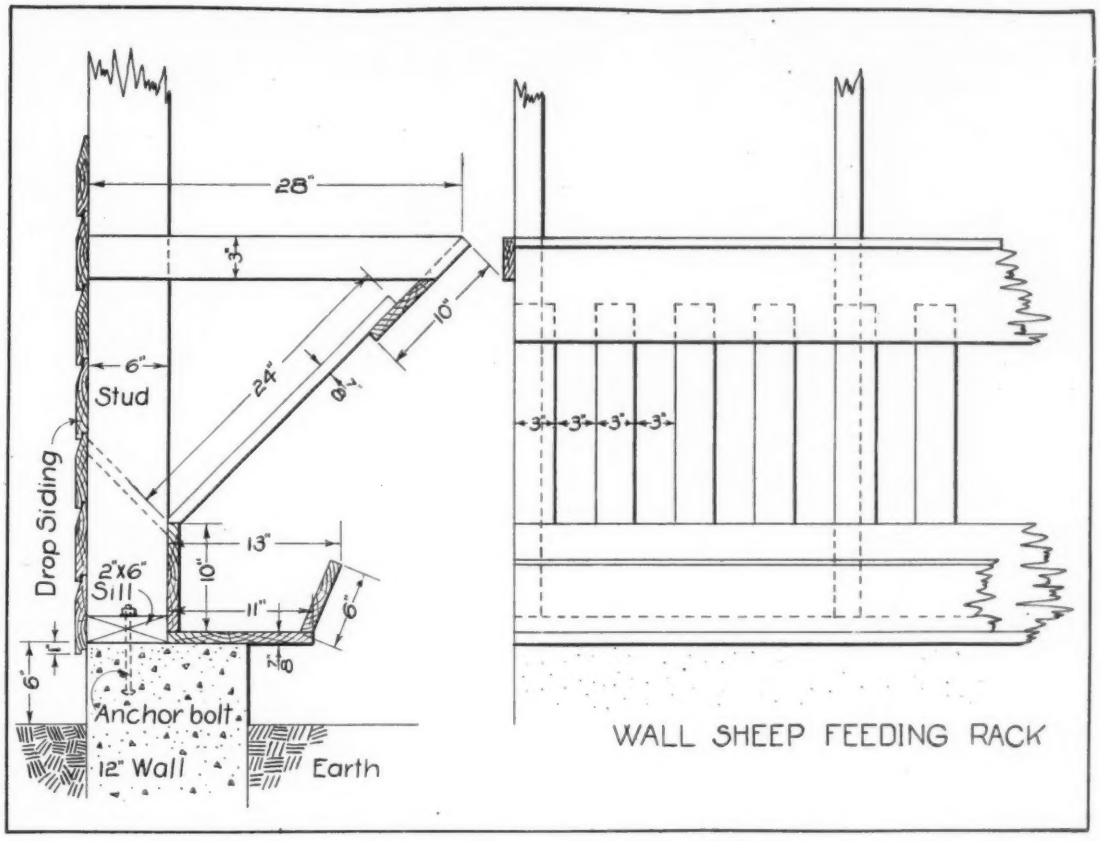
The wells are made of 26-gauge galvanized iron or sheet aluminum. The latter are very expensive, so the iron is recommended. They are both 13" deep, one being made 10" in diameter, and the other 12". The well board to which they are fastened is of $\frac{7}{8}$" stock, and the circles cut from it for the wells must be carefully worked out with saw and wood file. The wells are fastened in place with flat head nails, and the sharp edges pounded over into the wood with a ball peen hammer. With this much of the construction finished, assembling can commence. Glue and screw the sides onto the ends, and place the well board into position. Screw this solidly in place, and fasten in the partition. Now turn the cooker upside down, and pack around the wells with dry, fine saw dust. Tamp this with a small stick so that it may be perfectly tight. Heap the saw dust flush with the bottom edge, and lay on about $\frac{1}{2}$" of old newspapers. Press the bottom in place—use clamps if necessary—and screw the bottom in securely. This completes the body.

Glue up the top panel as you did the sides and ends, place it with its four strap hinges, then remove it and saw it thru the center. In finishing these sawed edges, take off as little material as possible.

The inside of each cover is a frame of $\frac{7}{8}$" stock, the front and back members being set at a slight angle so that the covers will clear the edges when lifted and dropped. These sections are filled with saw dust and newspapers with a sheet of 26-gauge galvanized iron tacked over each of them. When the covers are closed and fastened, they must fit *tightly* and *evenly* on the well board. They are fastened on the front edge with ordinary window sash fasteners. Ball or common casters should be attached to the bottom of the cooker.



DETAILS OF SHEEP FEEDING RACK.



DETAILS OF WALL SHEEP FEEDING RACK

No mention has been made of the wood to use. It makes little difference providing it is well dried stock. Plain red oak or birch are both suitable. Any of the common finishes can be applied, altho a plain varnish finish is recommended.

With the cooker completed, it will need a few accessories which can be purchased thru any furniture dealer. These consist of four soapstone disks, and racks upon which to set them, and the cooking dishes. These racks can be made in the forge shop, if desired, and disks of metal substituted for the soapstone, but they are not as desirable.

There are many booklets on the use of fireless cookers, and most cook books contain suggestions concerning them, so little space will be utilized in discussing the culinary end of it.

Fireless cookers must be kept clean and given an occasional sunbath. When not in use, the covers should be left up to air the wells. When one compartment only is in use, it is a good plan, altho it is not necessary in the cooker described, to place a pan of boiling water in the other well.

Different foods require different periods of cooking before they are placed in the cooker. The data on this may be secured from the books mentioned above.

SHEEP FEEDING RACK.

Louis M. Roehl, Director of Farm Shop Work, Cornell University, Ithaca, N. Y.

Sheep respond more readily to good feed and care than any other livestock and it is necessary that the flock be fed consistently and regularly to insure a wool clip of good weight and quality.

Good feeding is difficult without the use of a feeding rack for both hay and grains.

The hopper design of rack for feeding hay has the advantage over others by keeping the heads of the sheep out of the hay and thus preventing chaff, seeds, etc., from getting into the wool. The trough has the additional advantage of catching the leaves of the alfalfa, clover or other hay so they may be consumed. Without a trough underneath the hay the leaves would drop onto the bedding and hence would be lost. The length of rack may be made longer or shorter to suit the needs of any size of flock. If made eight foot or less in length the two middle posts and their cross ties may be omitted.

Bill of Material.

Lumber:		
Pieces	*Dimensions*	*Use*
6	1¾″x1¾″x3′ 7″	Posts
3	⅞″x6″x3′ 6″	Bases
2	⅞″x10″x3′ 6″	Ends
2	¾″x3″x3′ 0″	Ends
2	⅞″x3″ 2′ 10′	Ends
2	⅞″x3″x2′ 8″	Ends
2	⅞″x6″x2′ 6″	Ends of trough
3	⅞″x2″x2′ 3″	Ends below trough
2	⅞″x7″x11′ 10¼″	Sides of trough
1	⅞″x6″x11′ 10¼″	Trough partition
2	⅞″x10¼″x12′ 0″	Trough bottom
2	⅞″x10″x11′ 10¼″	Top boards
46	¾″x3″x2′ 2½″	Slats
6	1¾″x3½″ tapered to a point x 10″	Furring to nail top boards
Hardware:	1 lb. 6d common nails 2 lbs. 8d common nails	

In assembling, the 8d nails are used at all places where nails are driven into the 1¾″ pieces. The 6d nails are used at all other points. The lower ends of the slats are beveled as shown in the detail drawing and nailed to the top edge of the trough partition.

Those teachers of agricultural woodworking who are using the home project method may find the wall sheep-feeding rack a suitable home project. It is understood that

the length of rack and some of the details are in that case determined by the number of sheep, place where the rack has to be placed, kind of wall to be fastened to, thickness of wall, etc. The drawing can only serve to give general dimensions which if followed will make a serviceable rack.

It is felt that when a boy in the agricultural high school has obtained a *general notion of how to go at* the building of a rack of the kinds shown and thru his school farm shopwork has acquired the *knowledge of tool manipulation* to make it and thru his study of animal husbandry in the school classroom has acquired a *desire to build it*, the agricultural high school has done much toward adding one valuable young farmer to the community's general worth.

SHEEP AND HOG SHIPPING CRATE.

Louis M. Roehl.

Bill of Material.

Lumber:

Pieces	*Dimensions*	*Use*
2	13-16″x9⅞″x4′ 0″	Bottom
1	13-16″x6″x23″	Front end at bottom
7	13-16″x4″x23″	Ends and top at ends
4	13-16″x4″x21⅜″	Top
4	13-16″x4″x2′ 4″	Corner posts
2	13-16″x6″x4′ 0″	Sides at bottom
6	13-16″x4″x4′ 0″	Sides
1	13-16″x4″x19¾″	Gate support at bottom
1	13-16″x6″x2′ 6 3-16″	Gate
1	¾″ round x 4″	Pin to lock gate

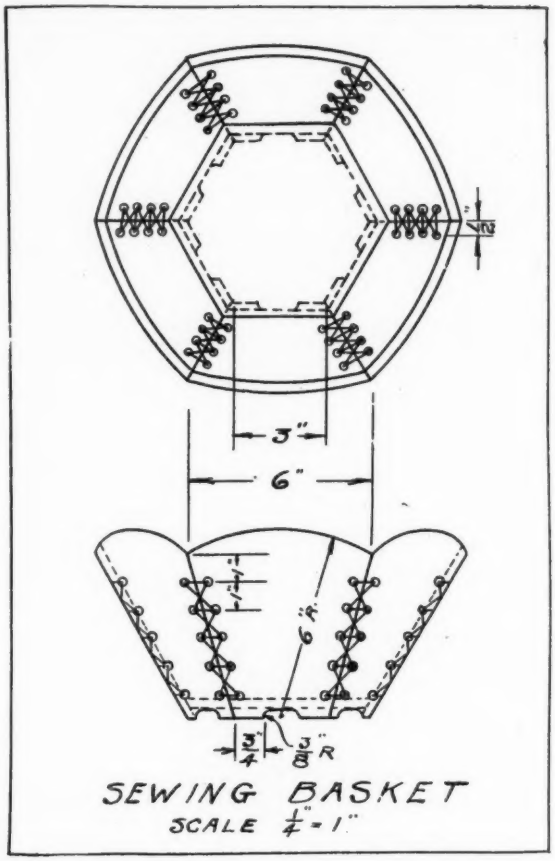
Hardware: 1 pound of 6d common nails.

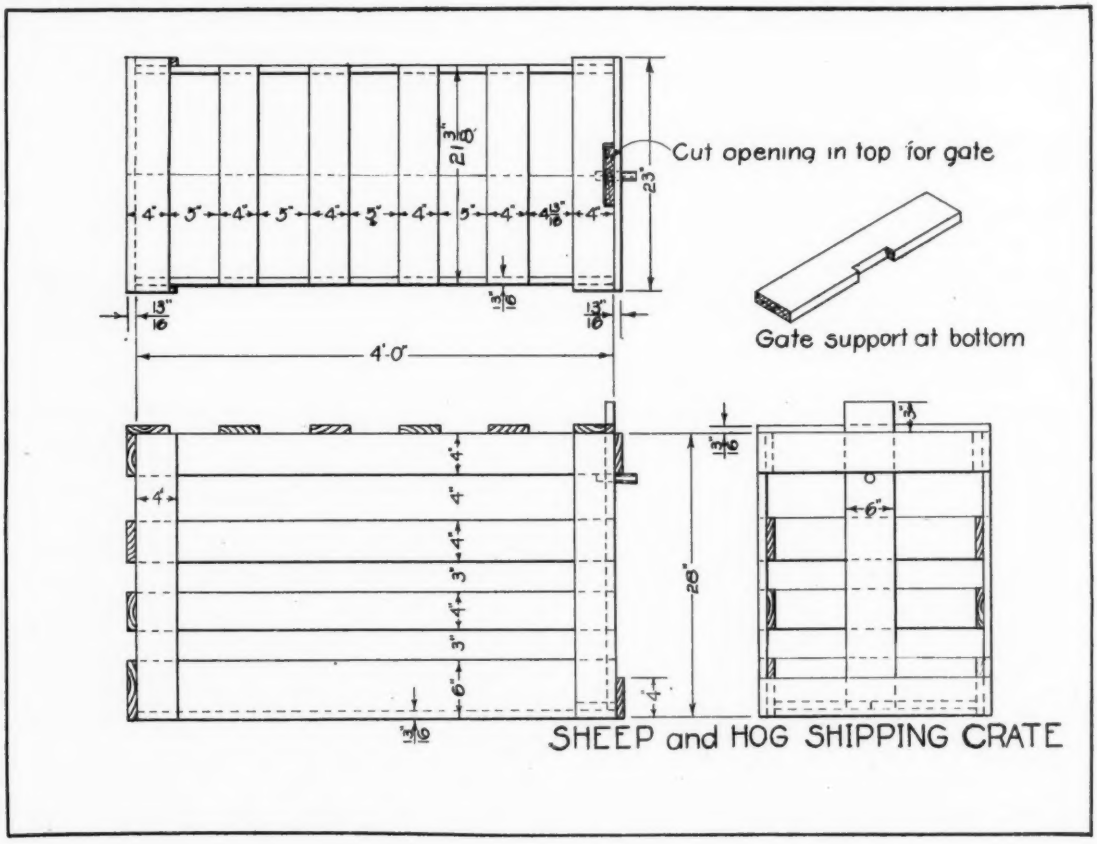
A SEWING BASKET.

Donald V. Ferguson.

This artistic little sewing basket consists of six identical sides and a hexagonal bottom. It is best made of ⅜ inch red gum and may be finished in the natural or with a walnut or mahogany stain. The bottom and the sides are laced together with shoe laces which are tied underneath the bottom.

The project is excellent for the sixth grade, especially in anticipation of the Christmas season.





NATIONAL SOCIETY FOR VOCATIONAL EDUCATION MEETS.

The twelfth annual convention of the society was held in St. Louis, Mo., Feb. 20, 21 and 22. The entire program was arranged and carried out with the following topics as the basis of discussion: Rehabilitation of Wounded Soldiers; Lessons of the War Upon Industrial Training; The States and the Smith-Hughes Act; War-Time Participation of Women in Industry—Its Permanent Effects.

The committee on arrangements had seemingly anticipated every requirement and had made ample provision except in a few cases where they had underestimated the number to be in attendance and larger meeting rooms had to be provided.

The Federal Board of Vocational Education, thru its different members, regional agents, state directors, state supervisors and others directly interested in the success of the work as proposed and now administered under that board, was very much in evidence. This is shown by an analysis of the programs of the general sessions and the sectional meetings.

This was unavoidable, of course, as the work of the Federal Board is to carry out successfully the principles of vocational education for which the National Society for Vocational Education has so long labored to have a place in our educational system.

Lack of space prevents a detailed analysis or review of the different topics as presented by the speakers in the general sessions or the different sections. All were well attended and profitable to all who are interested in the different phases of vocational education.

The different dinners held by sections or organizations were very successful and marked by a spirit of democracy and good-fellowship seldom noticed on such occasions. The account of the dinner of the agricultural section which was given Wednesday evening, February 19th, will serve as an illustration. At this dinner, James P. Munroe, vice-president Federal Board, acted as toastmaster or chairman. Short talks were made by Charles A. Prosser, Director of Federal Board; Arthur E. Holder, member of Federal Board; L. A. Hawkins, Chief, Division Vocational Education, Federal Board, and others of lesser fame. Along with the feast of reason and the flow of oratory, quite a number of apt stories were told to illustrate some point or some point was made to bring in an apt story to fit. The democracy of the occasion was shown by the way different speakers or story tellers were greeted. As an illustration when Director Prosser responded he was greeted with a chant often repeated, "Old pop Prosser isn't nearly the man he used to be."

Taken by and large, the 1919 meeting will live in the memory of those interested as the most successful meeting ever held by the association.

Conference of Bureau of Education.

Hon. P. P. Claxton, Commissioner of Education, arranged for the annual conference with those interested in vocational education to be held in St. Louis, Mo., on February 19. This was the fifth annual conference and was by far the most interesting and instructive of any so far held.

Commissioner Claxton was unavoidably detained in Washington, so the session was presided over by Dr. Wm. T. Bawden, Specialist in Industrial Education, Bureau of Education.

From advance information received, arrangements had been made for one hundred persons. This arrangement in no way met the demand for places at the dinner. One hundred four were taken care of and a number were disappointed on account of being unable to get in. The dinner was served in the Daniel Boone Room of the Statler Hotel and began promptly at 6:30.

After dinner a regular program, which in general dealt with lessons in vocational education, learned thru the need for specially trained men in the United States Army during the late world war, was very successfully carried out.

Lieut. Col. Strong, U. S. Army, gave a very instructive description and explanation of "Trade Tests and Personnel Work" as used in the selection of needed men in the service.

C. R. Dooley who was education director, vocational instruction, War Department Committee on Education and Special Training, followed with a reel of pictures made in different schools where soldiers were trained in special lines for service "over there."

Lieut. Col. Bingham spoke on the topic "Standardizing and Developing Trade Tests." Col. Bingham explained the methods used in developing the trade tests and showed that trade test, oral, picture and performance, if properly conducted, resulted in finding the right man for the given job.

Lieut. Col. Swann followed with "The Possibilities of Army Trade Tests in the Trades and Industries." Most of those present are or have been mechanics and all are now interested in the development of vocational training. The mental attitude of the audience was antagonistic toward the proposition of trade tests and, in most cases, absolutely against the idea of there being any value in such test. From remarks made by different persons in the conference before Col. Swann presented his analysis of the trade tests, one would suppose the discussion to follow would all be in the negative. The result as shown by later remarks from the floor, indicates that "Those who came to scoff, remained to pray."

DR. DAVID SNEDDEN,
Re-elected President of the Vocational Education Association.

Alvin E. Dodd Director Retail Research Association, New York City, next presented thought along the line of advantages of co-operation between the schools as labor organizations and employers to be derived by the use of trade and other tests to place the individual in the occupation where he would be most efficient.

The different addresses that had been made were then discussed by interested individuals who had enjoyed the same. The spirit of the open discussion seemed to be that of seeking information. The proof that the conference was a great success is in the fact that at eleven-thirty the chairman found it necessary to dismiss the meeting and those present then continued to informally discuss the different topics under consideration.

As an evidence of the widespread interest in these conferences of the Bureau of Education it is only necessary to state that all parts of the United States from Maine to California were represented. Of the 104 present there were representatives from 25 states and three from Canada.

International Association of Teachers of Printing.

Frank H. Shepherd, President of the Western Section, Corvallis, Ore., called a meeting of the executive committee at St. Louis, Mo., February 21.

This committee decided to hold a number of district or sectional meetings during the spring months and the summer vacation.

Arrangements for these meetings will be made by the president and notice was sent as soon as possible. The plan is to hold a series of round-table meetings at points convenient to the greatest number of teachers of printing.

A CORRECTION.

On page 96 of the March issue a picture of Red Cross bedside tables appeared. The explanation should have read:

"Part of one hundred bedside tables made by the manual training teachers of Davenport, Iowa, during the 'flu' epidemic. Mr. Charles A. Gesell, Instructor of Cabinet Making."

The Madison Association of Commerce, at Madison, Wis., in January, carried out in co-operation with the various departments of the University and other educational and civic institutions, a community program of industrial education. The program had for its purpose that of taking advantage of opportunities offered in the city for advancement along educational, musical, artistic, vocational and health lines, in industrial plants.

The program was intended to strengthen and to develop the educational side of the workers in industrial plants. To many men and women the war has brought opportunity for individual and community service that has been of particular satisfaction to them. The progress of community welfare offers opportunities for additional service to their fellows.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Working in Aluminum.

831. Q.—Can a handicraft jeweler work in aluminum, and if so, what are the particular points to be observed, and what kind of solder should be used?—*S. H. K.*

A.—It is impossible to solder aluminum. Of course, it is possible for a handicraft worker to work in aluminum, but not to carry out any problem where soldering is involved. This, of course, limits the nature of the work to saw-piercing and filing. It does not appeal to me as being a satisfactory metal for jewelry work.—*Augustus F. Rose.*

Solomon's Knot.

847. Q.—Will you kindly print instructions for tying the knot in making raffia bags where four strands of raffia are used? It looks like a "beetle" when completed. Please publish this in the magazine, as several teachers are watching for same. We used to call it "Solomon's Knot."—*M. M. P.*

A.—See Mr. Worst's article on another page of this issue.

Soldering Metal.

906. Q.—We have some difficulty in soldering thin, saw-pierced copper pieces to a thicker base of copper, such as a pierced motif upon a handle of a paper knife. Borax flux, with small pieces of hard silver solder, over the blaze of a powerful gasoline vapor torch, even when the metal appeared orange red, have failed to make solder run.

Sometimes, when some solder melts, other pieces attach themselves to the copper at edges and are very difficult to scrape away or otherwise remove. Similar difficulties in making good joints are felt in soldering silver cutouts to copper in patterns for watch fobs that have been tried. Do you think the difficulty lies with the flux employed or the heat? —*N. B. Z.*

A.—Your difficulty in soldering may arise from one of the following reasons. First, your flux (borax) may not be heavy enough, or it perhaps was not absolutely clean. The size and nature of your work requires what is termed light or heavy borax. By this is meant the amount of borax used in proportion to water. Second, your solder may not have been properly cleaned, or it may be too hard for the purpose. Solder is prepared in different grades for different work. Third, when soldering a small or thin piece of metal to a thicker piece, care must be exercised to have the largest piece brought to the soldering point first. When the large piece is heated to the right degree the small piece will also have received the same amount of heat.

Your difficulty in having the solder attach itself to the edges of your work, arises from the fact that the solder was not thoroly clean. If the solder has been handled by the fingers it takes on the natural oil or perspiration, and when heated rolls up into a ball and the oil coating prevents it from running.—*Augustus F. Rose.*

Recipe for Making Soap.

912. Q.—Can you supply me with a recipe for soap making suitable for a project in the fifth or sixth grade?—*L. L. W.*

A.—The Editor is unable to supply a recipe which has been successfully used in a school. He will be glad to act as intermediary and to receive from any interested teacher, a satisfactory recipe for transmission to the inquiring subscriber.

Renewing Cracked Varnished Surfaces.

916. Q.—I would like to inquire of your finisher what the trouble is when your house furniture, chairs particularly, have a cracked, checked varnished surface? What causes the little cracks in the varnish and how would you renew the finish?—*C. E. H.*

A.—The cracking or checking of varnish on furniture in general and on chairs in particular, is due to one of two causes. First, all varnishes silk, crack or check when the oil body of the film has become oxidized in the ultimate sense of the word, leaving a non-flexible film as a surface material. Second, it often happens and indeed is the general practice in a large number of furniture factories to give chairs one or two coats of a very heavy bodied, quick-drying varnish with which to build up a perfect surface. Over this is applied a finishing coat of a tougher grade varnish, generally quite distinct as regards the amount of oil used in the varnish as compared with that of the undercoat. For this reason there is a distinct difference in the expansion and contraction of these two varnishes with the consequent result that sooner or later the entire surface is destroyed by checking. The only recourse to be had in a case of this kind lies in the complete removal of the old finish, restaining and refinishing by using some good varnish like Pratt & Lambert's No. 61 thruout the process, avoiding any mixture of different bodied varnishes. Since your correspondent does not state the class of chairs in question, I am unable to give more specific information on this point.—*Ralph G. Waring.*

Housewifery.

By Lydia Ray Balderston. Cloth, 8v0, 353 pages. Price, $2 net. J. B. Lippincott Co., Philadelphia.

This book will appeal to teachers of household arts as a splendid manual of the technique of housekeeping in which there are presented, in a single logical work, hundreds of items of the practical processes which have been hitherto accessible only by consulting a large amount of scattered reference material. The author limits herself strictly to the problems of household work and to those matters which relate to the arrangement, purchase and use of furniture, equipment, and materials which the housewife uses in the operation of the home. Thruout the work is clear, complete and concise and well balanced as between scientific principles and commonsense, practical applications.

Drafting Room Methods.

By Charles D. Collins. Cloth, 149 pages. Price, $2, net. D. Van Nostrand Co., New York, N. Y.

This work is not a text but rather a complete reference book for the expert draftsman, who desires to have at his elbow a work which will refresh his memory on the standards, symbols and abbreviations used in a wide variety of work and standard tables of threads, pipe sizes, pipe fittings, key ways, gauges and miscellaneous mathematical tabulations. Special chapters are devoted to drafting room organization and system in which there is considerable miscellaneous information concerning patent office practice, thread cuts, record forms, etc.

The book is worthy of a place in the libraries of trade schools.

Joseph Pennell's Liberty Loan Poster.

Boards; nine illustrations. Price, $1, net. J. B. Lippincott Co., Philadelphia.

A personal account of the origin and development of the familiar poster used during the Fourth Liberty Loan drive. Teachers will find especially the descriptions of the mechanical processes of value.

Choosing a Career. E. W. Weaver. Price, ten cents. Vocational Guidance Association, Brooklyn, N. Y. This bulletin which was originally printed by the author for use in connection with his work as counsellor to the students of the Brooklyn Boys' High School, has been reissued for the benefit of young people who are working out their careers of usefulness under the direction of the Brooklyn Vocational Guidance Association. The pamphlet goes into the principles underlying the choosing of a career, the training necessary, how to choose an occupation, wages, and special schools or courses thru which the boy or girl may be led to select an occupation. A list of occupations and schools is attached for the benefit of the reader.

Rural Schools Bulletin. A monthly school paper published by the Rural Schools Bureau of Successful Farming, Des Moines, Ia. E. T. Meredith, publisher. This bulletin is intended for teachers in rural schools and offers practical outlines for work in the several grades covered by rural school work.